REPORT RESUMES

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TV FOR MONTANA EDUCATION, REPORT OF THE MONTANA EDUCATIONAL TELEVISION COMMITTEE.

BY- JORGENSEN, ERLING S.

MONTANA EDUCATIONAL TELEVISION COMMITTEE, BILLINGS

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THIS DOCUMENT IS A FULL REPORT OF THE MONTANA EDUCATIONAL TELEVISION COMMITTEE. IT CONTAINS DETAILED INFORMATION ON THE FOLLOWING POINTS, AS WELL AS PLANS FOR EDUCATIONAL TV DEVELOPMENT IN MONTANA--(1) MONTANA HAS GROWING NEEDS FOR IMPROVEMENT OF EDUCATIONAL METHODS, (2) EDUCATIONAL TV IS ENRICHING AND EXPANDING INSTRUCTIONAL PROGRAMS IN THE U.S., (3) EDUCATIONAL TV HAS BEEN INTENSIVELY STUDIED AND TESTED, (4) TV HAS POTENTIAL FOR USE IN MONTANA SCHOOLS, (5) MONTANA HAS RESOURCES WHICH CAN BE DISTRIBUTED TO THE WHOLE STATE VIA EDUCATIONAL TV, AND (6) DEVELOPMENT OF INSTRUCTIONAL TV IN MONTANA CAN BE PRACTICAL. (MS)

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TV FOR MONTANA EDUCATION

REPORT OF THE MONTANA EDUCATIONAL TELEVISION COMMITTEE

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TV FOR MONTANA EDUCATION

Report of the
Montana Educational Television Committee

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION

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June 1962

EM 005 592

Abstract

This is an abbreviated outline of the contents and recommendations of the full report of the Montana Educational Television Committee. The full report contains detailed information on the points mentioned here as well as plans for ETV development in Montana.

Montana faces growing needs for improvement of educational methods.

- **Growing enrollments will bring an enrollment increase of 30,000 students to the public schools by 1965. Enrollment in the University of Montana continues to grow faster than predictions have indicated.**

- **The teacher shortage continues serious. Montana shares with the rest of the nation the problem of finding qualified teachers to fill an increasing number of teaching positions.**

- **The increase of knowledge in all subject areas requires Montana schools to offer additional depth and variety in course content.**

- **Montana's population and geography continue to demand the maintenance of many small schools.**

Montana must continue to use all means available to improve its education programs, if its coming generations are to meet the challenges of the future.

Educational television is among the new instructional methods enriching and expanding the instructional programs in American education.

- **Instructional television is being used via broadcast transmission and closed-circuit to classrooms at all levels.**

- **62 ETV stations are now on the air broadcasting programs of general cultural and informational nature as well as formal instructional materials.**

- **ETV networks are operating in several states and others are in advance stages of planning.**

- **Courses in a wide variety of subjects are becoming available on film and video tape.**

- **Commercial TV stations, community antenna television systems, and national networks are contributing to the development and use of television for instructional purposes.**

- **In many of our nation's communities, ETV is making education accessible to many persons who are not in school.**

ETV is contributing valuable assistance in the solution of educational problems and the development of economical means for the improvement of instruction.

Educational television has been intensively studied and tested.

- In most subject areas and at all levels of instruction, students taught by television rank as high or higher in achievement as students taught by conventional methods.

- Favorable attitudes of teachers, students, and parents toward TV instruction tend to increase as their exposure to ETV increases.

- Resistance to TV instruction is centered on how TV is used rather than on a basic objection to the use of TV in instruction.

Research has verified that TV instruction is effective and appropriate.

TV has potential for effective use in Montana's schools and colleges.

- **TV can bring enriching materials to existing courses—increasing and improving course offerings of small and isolated schools.**

- **Urban schools and colleges can use TV to solve problems of increased enrollments.**

- **TV can be used to exchange instruction between units of the University of Montana.**

- **TV can be used to extend educational opportunities beyond the classroom to homebound students, dropouts, and adults.**

- **TV offers potential for continuing in-service education for members of professional groups as well as for persons in other occupations.**

ETV can serve Montana's educational needs.

Montana has resources it can distribute efficiently to the whole state through ETV.

- **Existing television facilities in commercial stations, translator stations, community antenna systems, and microwave relay systems can be used for educational purposes.**

- **Six TV channels are reserved for education in Montana.**

- **Video tape and television film offer immediate means for distribution of ETV programs.**

- **Instruction by exceptionally skilled teachers can be distributed to larger numbers of students through TV than is possible through conventional means.**

- **Resources of the University of Montana, of state government offices, and of other resource lay personnel can be made available to classrooms and homes throughout the state.**

- **Resources of neighboring states and educational and professional centers outside of Montana can be brought to Montanans by TV.**

Educational television offers a means of successfully organizing Montana's resources and distributing them to the benefit of our schools and colleges.

Development of instructional television in Montana is practical if it is based on present resources and expanded in an orderly fashion to a state-wide system.

- **A state ETV network should begin with the linking of existing facilities at Montana State University and Montana State College and the addition of transmitters in Missoula and Bozeman.**

- **A second stage of development should include the construction of transmitters at Helena, Billings, Butte, and Great Falls and the linking of these transmitters to Missoula and Bozeman.**

- **The third stage should include the construction of transmitters at Kalispell, Miles City, Havre, and the linking of these to the existing network.**

- **The fourth stage should be the construction of studio origination facilities at Helena.**

- **Additional translator stations should be built to extend the coverage of ETV transmitters.**

The cost of building such a total network: $1,500,000. The annual cost of operating such a network: $506,000. The per pupil cost of constructing the network: $11.54. The per pupil cost of operating the network per year: $3.89.

Based upon the study of the Montana ETV Committee, the following recommendations are made:

1. **That a network of educational television stations be established in Montana to serve elementary, secondary, higher, and adult education.**

2. **That Montana's educational television network be organized under the existing state authorities in education, the State Superintendent of Public Instruction and the State Board of Education, ex-officio Regents of the University.**

3. **That funds be made available to the State Superintendent of Public Instruction and the State Board of Education, ex-officio Regents of the University, for contracting with an independent consulting engineer for an engineering survey to establish precise technical details and costs of the state ETV network as proposed in this report.**

4. **That the State Superintendent of Public Instruction and the State Board of Education, ex-officio Regents of the University, through appropriate channels, apprise officials of the state government and legislators of the need for appropriation of the funds necessary for the establishment of such an ETV network and that due consideration be given this need.**

5. **That the Montana ETV Committee seek to obtain the active cooperation of all agencies, organizations, groups, and individuals necessary to expedite the establishment of an educational television network. Cooperation and assistance should be sought from the Governor, the Legislature, the State Board of Education, ex-officio Regents of the University, as well as local school boards, administrators, and the professional educational associations. Furthermore, that the Committee seek the active cooperation of Montana commercial television stations, community antenna companies, common carrier companies, and such utilities as can assist in this development.**

6. That the Montana ETV Committee continue to work to develop a public awareness of the advantages and requirements of educational television as a teaching medium and seek to stimulate planning by local and state agencies to incorporate educational television into the future education program; that consideration be given to:
    a. Provision at the units of the University of Montana for instruction in the classroom use of television for all teacher trainees, professional training in the production of television instruction, and training in the administration and coordination of television instruction.
    b. The design and construction of future school buildings, elementary, secondary and college, to make possible the best use of instructional television.
    c. The scheduling of workshops and conferences at all levels of education to develop understanding on the part of teachers, administrators, and lay citizens of the role of instructional TV in education.
7. That the Montana ETV Committee be continued as an advisory board to the State Superintendent of Public Instruction and the State Board of Education, ex-officio Regents of the University, and that the committee, as required to carry out its functions, designate individuals or groups to serve as task forces in specific areas.
8. That the Montana ETV Committee continue to keep abreast of developments in educational television and to inform Montanans of these developments in order to bring the benefits of such development to the state.

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Foreword

I hope that this report will help to stimulate greater activity in Montana to bring to the people of our state the benefits of educational television.

For some time it has been my conviction that the problems of providing good education with the resources available in our sparsely-populated state can be lessened materially by the widespread application of televised instruction. Heartened by the interest displayed by diverse groups of citizens to whom I have been privileged to present this thought, I have found further encouragement in the willingness of able people from all levels of education to serve on the Montana Educational Television Committee which I organized in 1959. Since that time, developments of significance have included the undertaking of this study, which was made possible by a Ford Foundation grant, eager participation by leading school personnel and lay citizens in our Ford Foundation-sponsored "Go and See" project, and the first efforts of local school boards to institute televised instruction as part of the regular school program.

From these beginnings, Montana must move to take advantage of television's potential through the orderly development of adequate facilities, with the understanding that the required investment is one which offers long-range and ever-growing benefits. I hope that this report will point the way to positive action by responsible officials at all levels, and especially by the State Legislature with which rests the ultimate responsibility for providing for the education of Montana youth.

Sincere appreciation is expressed to all who have given encouragement and asisstance. Particular recognition is due the Ford Foundation for making the study possible, and Dr. Erling S. Jorgensen for his service as Project Director.

HARRIET MILLER
State Superintendent of Public Instruction
Helena
1962

Introduction

TV FOR MONTANA EDUCATION, the Report of the Montana Educational Television Committee, is based upon the extensive study report submitted by Dr. Erling S. Jorgensen, ETV Project Director, to the Montana Educational Television Committee.

The Montana Educational Television Committee is pleased to extend to Dr. Jorgensen its gratitude for his detailed and informative study and to present to the people of Montana the following report on TV for Montana Education .

Thomas E. Moriarty, Ph.D.
Chairman, Montana Educational
Television Committee
Billings, Montana
1962

Acknowledgments

I am indebted to the members of the Montana ETV Committee whose assistance in providing information, planning and counsel in the preparation of this report was invaluable. In particular, Mr. Archer S. Taylor's complete knowledge of television engineering detail and deep interest in the uses of educational television provided the basis for the technical ETV plan for Montana. Mr. Taylor's assistance and close cooperation in the preparation of this report is gratefully acknowledged. State Superintendent of Public Instruction Harriet Miller and Dr. Thomas Moriarty, Chairman of the Montana ETV Committee, provided helpful assistance in editing the report into its final form. Mrs. Barbara Longmaid, Executive Assistant to the Superintendent of Public Instruction is particularly to be thanked for her expert editorial assistance.

Miss Elizabeth Harrison and Mrs. Elizabeth Weller of the Office of Public Instruction were of great help in checking statistics, and typing this report. Mr. Arthur Jette of the Montana State University News Service provided art work for the report. Their help is acknowledged with appreciation.

In the course of my journeys to the nation's ETV centers, I imposed upon the courtesy and hospitality of many busy administrators, teachers, ETV station personnel and others associated with the use of TV in schools. For conferring with me and allowing me to visit their classrooms and studios, as well as for giving permission for use of pictures and graphic materials in this report, I am grateful.

Finally, I am indebted to the Ford Foundation which made the Montana ETV Project study and the publication of this report possible, and to Montana State University for allowing me a leave of absence from my regular duties and providing a base of operations during the study.

It is my sincere hope that this report will prove valuable in planning Montana's future use of ETV and that Montana's citizens will benefit from a wise use of this medium of communication which holds such great educational promise.

Erling S. Jorgensen, Ph.D.
Director, Montana ETV Project
Missoula, Montana
June, 1962

CHAPTER 1

Educational and Instructional Television

Montanans concerned about the problems of education in our state are becoming seriously interested in the educational potential of new technological developments. Among the new developments is educational television, a valuable and economical teaching aid in hundreds of schools across the nation.

Recognizing the potential of television as a teaching aid and wishing to examine the possible uses of this medium for the schools of Montana, the State Superintendent of Public Instruction organized the Montana Educational Television Committee representing public elementary, secondary and higher education in the state. The committee was successful in securing the financial support of the Ford Foundation for a thorough study of the educational uses of television and preparation of a plan for the orderly development of ETV in Montana. The purposes of the Montana ETV Project have been:

1. studying ETV uses in the United States;
2. determining ETV implications for Montana;
3. informing Montanans of the impact and potential of ETV;
4. preparing a plan for ETV development tailored to Montana's needs and resources.

This report explores ways in which television may be used to meet the challenges of educating Montana's future citizens. It describes how ETV is being used in other places, what research has discovered regarding teaching by TV and how Montana can use ETV. Finally, this report presents a plan for the development of a state ETV network and makes recommendations for implementing the plan.

Before describing the educational uses of TV in the schools of the United States, this report reviews some of the background of the growth of this medium.

Definitions

As shown by the following delineations, the term "educational television" is used in a number of different ways.

Educational Television. "Educational television" is a general term applied both to individual television programs of an instructional nature broadcast by commercial TV stations and networks, and to the programming broadcast by the nation's noncommercial educational television stations. Since most ETV stations broadcast college courses for credit or classroom television lessons for schools, the term "educational television" includes programming of a formal, instructional nature as well as that of a cultural informative nature.

Instructional television. "Instructional television" is the term generally applied to television materials intended for direct instructional use on ETV, commercial TV stations or via closed-circuit television. Instructional television implies a degree of organization compatible with regular instructional schedules of schools and colleges and in addition, tends to imply use of the telecast materials in the classroom either as complete lessons or as supplementary material. See Figure 1.

Broadcast and Closed-Circuit Television. Television signals, originated in TV cameras and microphones, can be transmitted to TV receivers in two ways. They can be converted to broadcast signals and transmitted via TV towers and antennas through the air in the conventional broadcast manner. They can also be transmitted by "closed-circuit" through cables and microwave systems. Since signals of the latter type are receivable only by receivers connected directly to the system, the system is known as a "closed" circuit as opposed to the broadcast system which is known as an "open" circuit. "Closed-circuit TV" can reach a limited number of receivers in a building or even within a room. It can also reach large numbers of receivers connected by cable in a community, a county, a state, or region.

Networks. Networks of TV stations or of closed-circuit TV facilities link a number of stations or systems for common distribution of programs. There are three national TV networks and a number of regional networks of commercial stations. Simi-

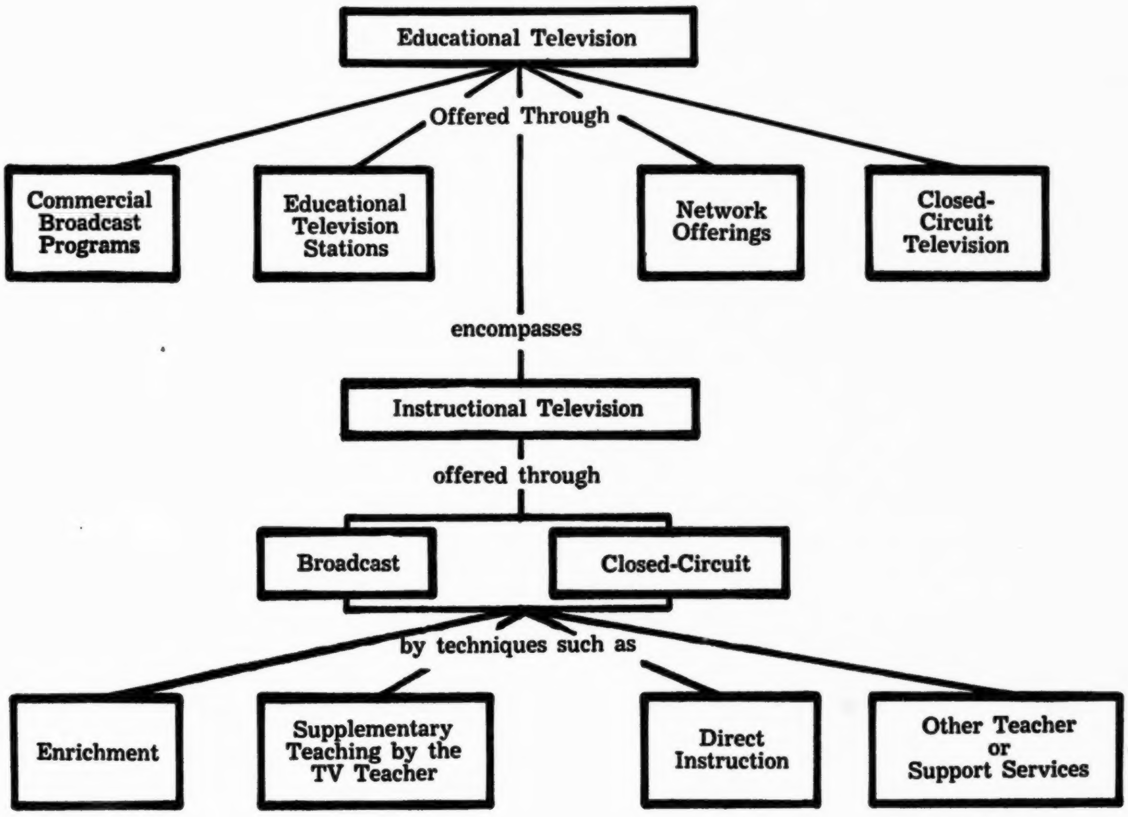

Educational Television
Offered Through
Commercial Broadcast Programs
Educational Television Stations
Network Offerings
Closed-Circuit Television
encompasses
Instructional Television
offered through
Broadcast
Closed-Circuit
by techniques such as
Enrichment
Supplementary Teaching by the TV Teacher
Direct Instruction
Other Teacher or Support Services

FIGURE 1. The place of instructional television.

By permission from *Educational Television Guidebook* by Phillip Lewis. Copyright, 1961. McGraw-Hill Book Co., Inc., p. 12.

larly, there is a national educational TV network, National Educational Television (N.E.T.), operated by the National Educational Television and Radio Center in New York City, and a growing number of state and regional educational networks.

The Growth of Educational Television

The use of television for educational purposes began with experiments in the midwest in the early 1930's. These experiments concentrated on the physical possibilities of transmission of instructional materials by TV. By 1936, New York University cooperated with the National Broadcasting Company in the presentation of experimental educational programs in the New York area. In 1948 commercial station WFIL-TV in Philadelphia broadcast ten programs a week to classrooms of the city. Since that time other commercial TV stations have recognized the important role of instructional television and have cooperated with local schools in the production of classroom lessons. The development of educational, noncommercial television stations has in numerous instances been substantially stimulated by contributions of equipment and money from commercial television broadcasters.

The first television station owned and operated by an educational institution was WOI-TV at Iowa State College, Ames, Iowa. WOI-TV went on the air February 21, 1950, and broadcast a wide range of local and national commercial and noncommercial educational programs. Today, there are a number of educationally-owned, commercially-operated television stations in the nation.

On April 13, 1952, the Federal Communications Commission (F.C.C.) issued its historic Sixth Report and Order assigning TV channels to all of the major communities in the United States. It also reserved channels for noncommercial educational television in 242 communities. Subsequent additions raised this number to 273. A number of educational organizations were largely responsible for the development of the F.C.C. policy. Among them were the National Education Association, the U. S. Office of Education, the National Association of Educational Broadcasters (an organization of noncommercial radio stations owned by educational institutions), and the Joint Committee on Educational Television, representing a wide range of educational groups.

ETV Stations

The first noncommercial educational television station was licensed to the University of Houston and the Houston Independent School District. With the call letters, KUHT-TV, it began

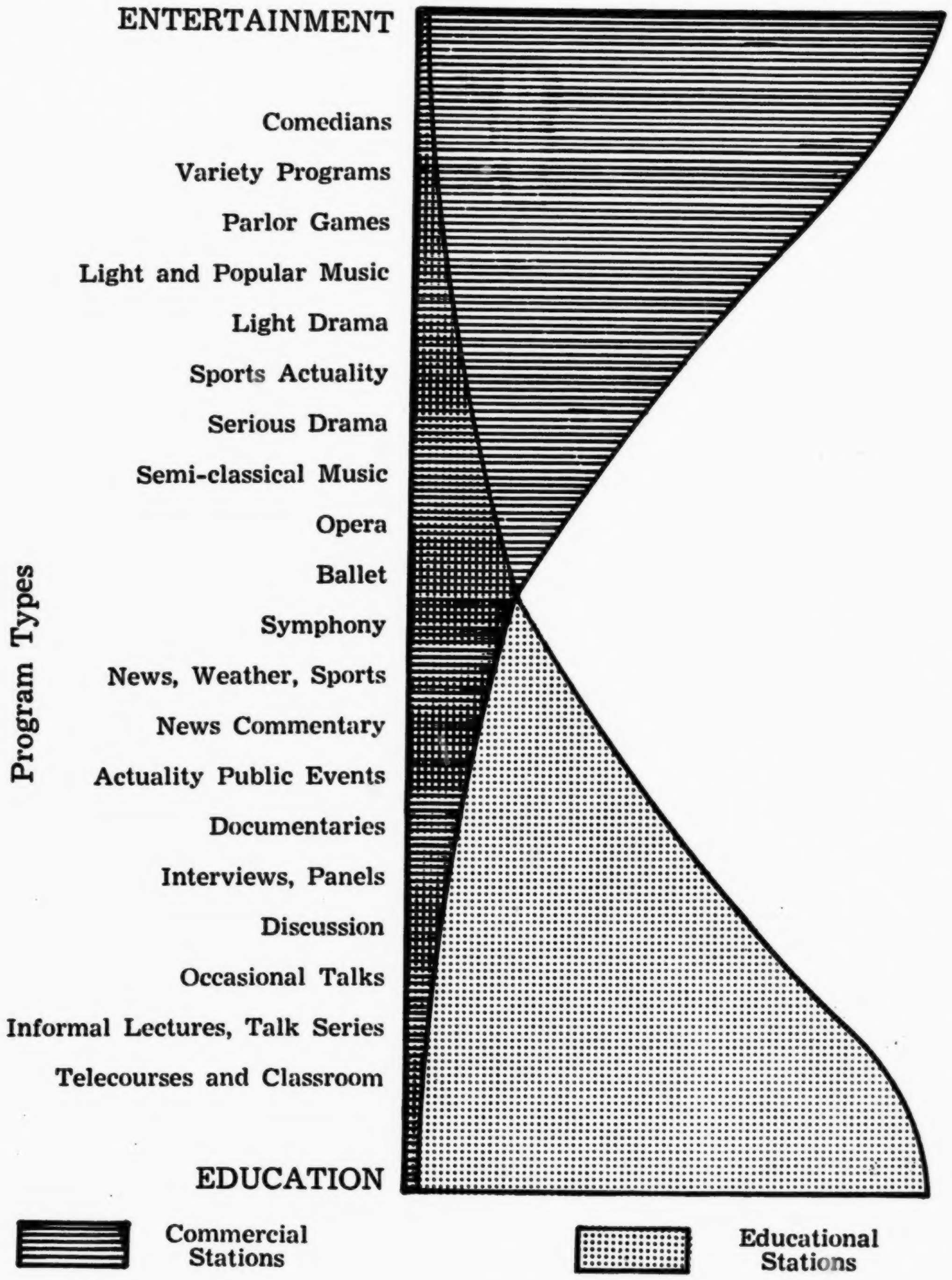


FIGURE 2. Types of programs on commercial and educational TV stations arranged on a continuum from pure entertainment to formal education.

By permission from Dr. I. Keith Tyler, Ohio State University, and from Lee Campion and Yvonne Lanagan, eds. *And TV, Too!*, D.A.V.I., National Education Association, Washington, D.C., 1961, p. 15.

broadcasting in May, 1953. Since that time, 62 ETV stations licensed to universities, public schools, and community groups have gone on the air. Community television organizations generally include in their supporting organizations the schools and colleges of an area. Examples of the community type are: WQED-TV in Pittsburgh, KTCA-TV, Minneapolis-St. Paul, KQED-TV in San Francisco, KCTS-TV in Seattle, and WETA-TV, Washington, D.C. The University of Wisconsin, the University of Nebraska, Michigan State University, the University of Utah, and the University of South Dakota are among the university and college-owned TV stations. Public schools in Ogden, Utah; Clover Park, Washington; Miami, Florida; Des Moines, Iowa; and Denver, Colorado, are among those operating ETV stations.

Educational television stations generally receive financial support from educational institutions, gifts and grants from industry and philanthropic organizations, and public contributions. It is frequently the practice for public schools to contribute a per pupil assessment for support of the ETV station. Some stations have large operating budgets; others have limited funds.

The range of programming over ETV stations is wide. Some devote themselves almost exclusively to classroom instructional programming. Others include instructional television for diverse purposes, such as adult education, homemaking, guidance, hobby and cultural programs, informational programs, and a small percentage of entertainment programming. Generally, the programming of educational television stations reverses the pattern of commercial television stations. The programming of a mass entertainment appeal which forms the majority of a commercial station's schedule typically is the least frequent type on an educational station. Programming to a specific interest group, typically infrequent on commercial stations, usually forms the major portion of an ETV station's schedule. See Figure 2.

ETV Networks

In 1953, the National Educational Television and Radio Center was established through a grant from the Fund for the Advancement of Education of the Ford Foundation. Fifty-eight of the 62 ETV stations are affiliated with N.E.T.R.C. The Center provides for the production of educational programs for broadcast on the affiliated N.E.T. stations and serves as a medium of exchange of programs produced by individual ETV stations. Recently, the N.E.T.R.C. has begun an exchange of programs with foreign television systems under an organization known as *Intertel.* Through this exchange, outstanding programs are selected from such

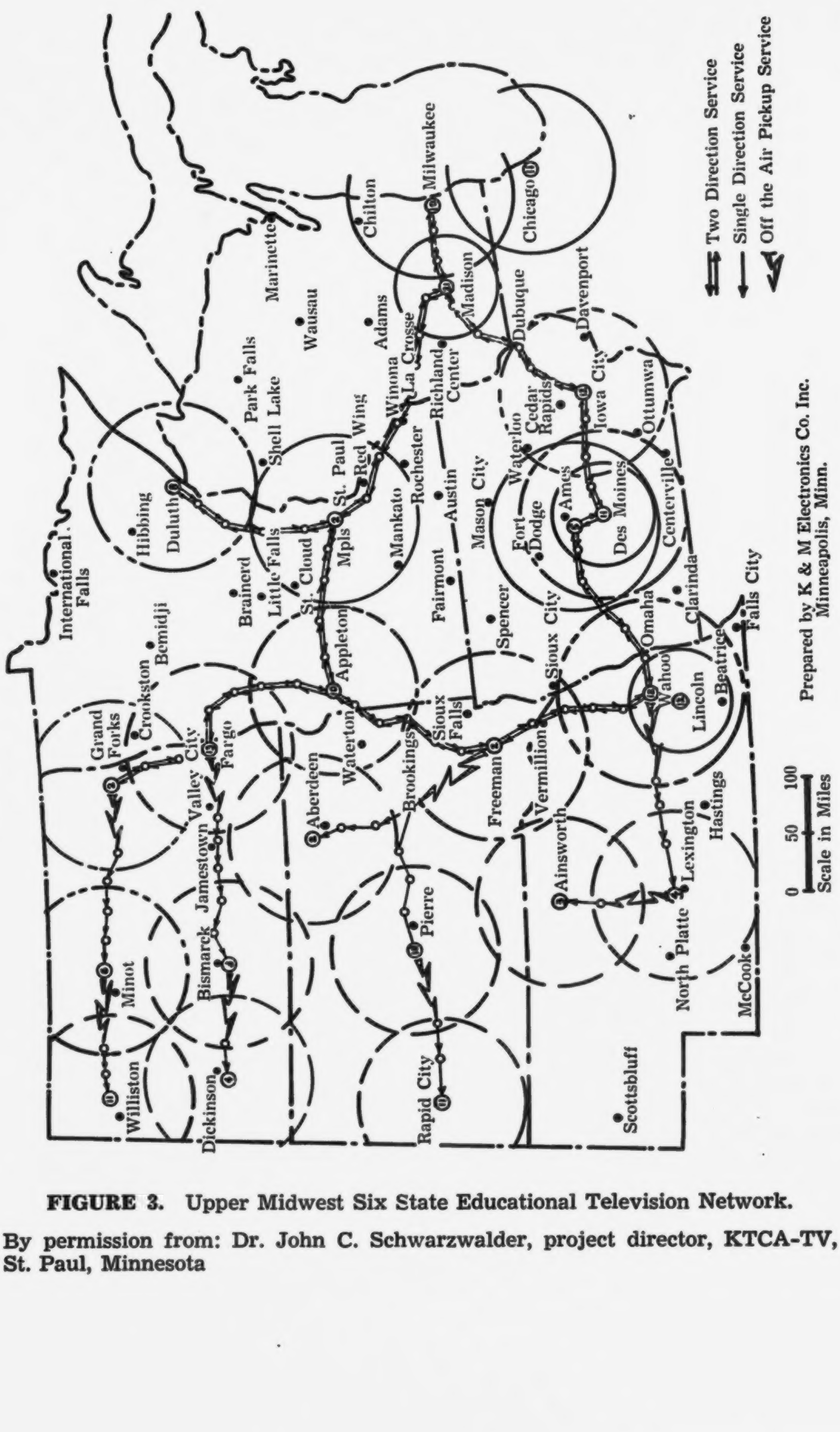

International Falls
Hibbing
Duluth
Bemidji
Crookston
Grand Forks
Valley City
Fargo
Jamestown
Bismarck
Minot
Williston
Dickinson
Brainerd
Little Falls
St. Cloud
Appleton
Mpls
St. Paul
Red Wing
Shell Lake
Park Falls
Wausau
Marinette
Chilton
Milwaukee
Chicago
Madison
Adams
Winona
La Crosse
Richland Center
Rochester
Mankato
Austin
Fairmont
Mason City
Spencer
Fort Dodge
Waterloo
Cedar Rapids
Dubuque
Davenport
Iowa City
Ames
Des Moines
Ottumwa
Centerville
Clarinda
Omaha
Falls City
Beatrice
Lincoln
Wahoo
Sioux City
Vermillion
Freeman
Sioux Falls
Brookings
Waterton
Aberdeen
Pierre
Rapid City
Ainsworth
Hastings
Lexington
North Platte
McCook
Scottsbluff
Two Direction Service
Single Direction Service
Off the Air Pickup Service
0
50
100
Scale in Miles
Prepared by K & M Electronics Co. Inc.
Minneapolis, Minn.

FIGURE 3. Upper Midwest Six State Educational Television Network.

By permission from: Dr. John C. Schwarzwalder, project director, KTCA-TV, St. Paul, Minnesota sources as the British Broadcasting Corporation, the French National Network, and Euro-vision, a network of European TV stations of various nationalities.

The N.E.T.R.C. also serves as a clearing house for information and as an important stimulant to the development of new ETV stations. Discussions have begun with regard to the development of a national interconnected network of ETV stations.

The first of a growing number of state ETV networks was built by the Alabama ETV Commission. This Commission now operates three transmitters in Alabama and has a fourth under construction. Programming is originated at three locations and includes programming from the N.E.T.R.C. as well. State networks of varying sizes exist in California, Florida, Oregon and Oklahoma.

Network development is under way in several other states. In the midwest, North Dakota, South Dakota, Nebraska, Minnesota, Iowa and Wisconsin are joined in a cooperative effort aimed at the establishment of a six-state ETV network. The legislature of each of these states has passed a resolution favoring the proposed network. In some of these states, among them North Dakota, appropriations were passed in the 1961 sessions for purposes of preparing plans and informing the public of ETV's potential. Figure 3 is a map of the planned network. In its ultimate form it will reach into eastern Montana and will offer Montana possibilities of linkage with mid-western ETV centers.

Education on Commercial Television Stations

As noted earlier, commercial TV stations have been instrumental in the development of educational television. Stations in Philadelphia, New York, Cleveland, St. Louis, and Los Angeles were among the early promoters of this use of the television medium. Although no pattern exists, most such educational programming is made possible through the donation of time and facilities to educational institutions and groups. However, a large number of commercial TV stations originate programs independently of educational institutions. These programs frequently serve as supplemental resource materials for classroom teachers.

In Montana, KFBB-TV in Great Falls has long cooperated with the College of Great Falls in the production of college courses for credit. Other commercial stations in Montana have cooperated with public schools in a more general type of programming which includes appearances by school personnel and school-related groups.

Pennsylvania State University, a pioneer in instructional television, has three closed-circuit systems in operation on its campus. The cabinet near the professor's right hand houses the "feedback" controls which make it possible for students in many different rooms to signal the teacher when they have questions. The teacher can then connect the classroom microphone to the audio circuit so that all can hear the question.

National television networks have offered program series of an instructional nature with cooperating institutions of higher education offering credit. Dr. Frank Baxter's course on Shakespeare, broadcast by CBS in 1954, was the first nationwide experiment in this direction. In more recent years, the National Broadcasting Company's *Continental Classroom* has broadcast programs in the sciences and mathematics. In 1960-61 over 150,000 students received credit from one of 127 colleges and universities for *Continental Classroom: Mathematics.* In the 1961-62 school year, CBS-TV is offering the course: "The New Biology"; NBC-TV continues *Continental Classroom* with the course: "The Structures and Functions of American Government."

The Growth of Instructional Television

As the number of educational television stations and commercial television stations broadcasting educational materials has grown, a parallel development has occurred in the growth of instructional television for the classroom. A growing number of school districts and universities have found closed-circuit television to have great potential for the solution of educational problems resulting from increased enrollments and the need for specialized instruction. The most dramatic and long-standing closed-circuit TV experiment has been that of the Washington County Schools in Hagerstown, Maryland. Other noteworthy closed-circuit TV developments are located in Anaheim, California, and at Pennsylvania State University where three closed-circuit systems are currently in operation transmitting televised lectures and demonstrations around the campus. One hundred fifty to two hundred educational institutions in the United States have been counted as users of closed-circuit television instruction. A statewide closed-circuit network has begun operation in South Carolina.

The Development of Syndicated TV Instruction

A number of syndicated television teaching materials are becoming available to schools across the nation. A notable example is the *Parlons Francais* series in elementary French. These lessons, produced originally on educational television in Boston, Massachusetts, have now been syndicated on video-tape and film for distribution to schools across the nation. This series of television programs is accompanied by recordings for use in the classroom and by workbooks specifically designed for this course. Special teachers' materials on film and video-tape as well as records and books assist the teacher in developing a teaching knowledge of French. Several dozen schools and many educational television stations are using this series.

Efforts to develop other such syndicated course materials are being made in several places in the country. Catalogs are available listing television courses which have been taught over various television facilities and stored on film or tape. Many of these are stored in the files of the National Educational Television and Radio Center. The Midwest Program on Airborne Television Instruction courses are available; others are available from individual ETV stations and school systems. One of the developments of the next five years will be the increased availability of instructional materials and courses on film and video-tape.

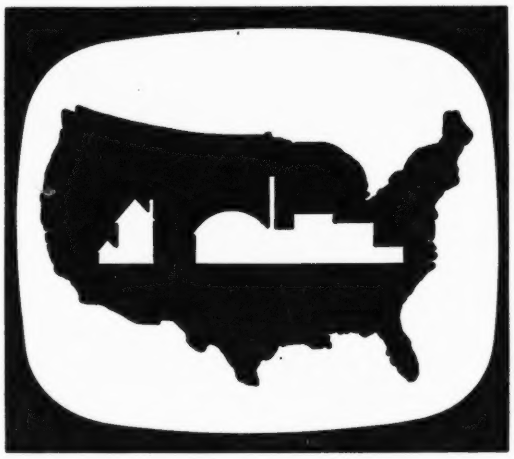
Direct Versus Supplemental Instruction

The two major types of instructional television are direct instruction and supplemental instruction. In direct instruction, TV is used to bring complete courses of instruction into classrooms or homes. Depending upon the age of the students and upon the specific requirements of the course, a classroom teacher may or may not be in attendance in the television classroom. Frequently, pupil-teacher discussion of the material follows the televised presentation.

Supplemental instruction includes various types of TV utilization. Among the most numerous of these is the "major resource" type. In this use of instructional television, the TV instructor presents materials which the classroom teacher may be unable to present because of lack of training or lack of equipment and facilities. Since the TV instructor reaches a large number of classrooms, it is more economical to supply for him needed extra equipment or other teaching materials. The TV teacher and the classroom teacher become a team, each responsible for part of the course material. The classroom teacher uses the material presented by television as a major resource.

Supplemental TV viewing may be used to enrich courses. Television broadcasts of recent presidential inaugurations are examples of the kind of material used to supplement and enrich courses in American history and political science. Travelogs and cultural programs from other countries are further examples of this type of television use.

CHAPTER 2



Televised Instruction in the Schools of the U. S.

To determine the extent of the use of televised instruction, the Montana ETV Project gathered printed information from the United States and other countries. In addition, more than fifty instructional television installations in schools and colleges as well as educational television stations were visited. Appendix A lists these installations.

It is conservatively estimated that during the 1960-61 school year 10,000 schools used televised instruction in classrooms housing five million students. Students received television instruction through broadcasts of educational TV stations, through commercial stations, and by closed-circuit television.

Virtually all subjects and levels of instruction are being taught by television in one school system or another in the country. Kindergarten classes receive instruction in pre-phonics, art, music, dance and nature study. The primary grades receive instruction in arithmetic, reading, literature, art, music, science, and other subjects. In the intermediate grades a similar variety of televised course work is found, with emphasis on science, foreign language instruction, and social studies. At the junior high level, laboratory sciences, courses in history, civics, foreign language and careers are repeatedly found in the offerings of schools across the country. At the high school level, there is a narrowing of the number of subject areas taught by television. However, courses in the sciences, foreign languages, English, literature, and social sciences are offered with science and social sciences most frequent. At the undergraduate level, a wide variety of instruction by television exists. The sciences, ROTC, and education courses predominate at this level. There are very few examples of graduate instruction by television; the majority of those found are teacher in-service training and extension courses.

For purposes of clarity, an arbitrary organization by level of instruction is used in this report.

TV in the Elementary School

The use of instructional television has been greatest in elementary schools. There are several reasons for this. Perhaps the most important is the conviction of school administrators and teachers that scheduling of telecast materials is easier in the elementary classroom where each class is a self-contained unit under one teacher for the total day. A second reason is that a large part of instructional materials at the elementary level is easily translated to the television medium.

Pre-School and Kindergarten

Philadelphia, Pittsburgh, Minneapolis, and other school systems make use of television at the pre-school level as well as at the kindergarten level. There seems no doubt that the fascination for television demonstrated by the child at home carries over into classroom television situations.

In Sacramento, California, a kindergarten lesson aimed at improving the child's auditory discrimination with regard to various sounds is telecast three times weekly. This training develops in the child a background for first grade reading, and has proved popular with teachers and children.

Primary Grades

Television's visual appeal and intimacy are distinct advantages for instruction at the primary level. Careful selection of the teacher and careful attention to the organization of lesson materials are essential. The short attention span of primary grade children demands that programs be shorter than for older children. The 15-20 minute program has become standard at this level.

Of great significance at the primary grade level is the impact of foreign language instruction using television, phonograph records, tape recordings, films, and other media. A number of different languages are being taught by TV in many school systems across the country. Spanish and French courses are most frequent.

The visual arts are well adapted to primary grade TV instruction. Drawing, lettering, and art appreciation are frequently found on television program schedules for primary grades. In Columbus, Ohio, art lessons for the primary grades have been highly successful.

Some other primary grade programs of note include: supplementary physical education class materials televised to Columbus, Ohio, schools; "Book Parade" and "Children's Hour," for grades kindergarten through three, and a safety program, grades kindergarten through eight, in the Detroit Public Schools; weekly 15-minute programs in rhythm, social studies, and creative arts in Philadelphia; and elementary music, language arts, foreign language and science in the Seattle Public Schools.

In the Washington County Schools, Hagerstown, Maryland, three channels of a six-channel closed-circuit system are directed to all elementary schools in the county. Among the areas of instruction enriched by TV are first, second, and third grade arithmetic; first grade science; first, second, and third grade art; primary reading skills; and second grade music. In addition, some supplementary commercial programs are used by the primary grades.

Intermediate Grades

The impact of television has been greatest at the fourth, fifth, and sixth grade levels. It is in these grades that foreign language instruction and elementary science instruction are concentrated. A wide variety of foreign languages is being taught with French and Spanish the most popular. Foreign language TV lessons rely heavily on a dramatic demonstration using hand puppets or dolls to enact scenes representative of the central themes of lessons. In the Hagerstown closed-circuit system, the following courses are being taught: fourth, fifth and sixth grade arithmetic; fourth and fifth grade social studies; fourth, fifth, sixth and seventh grade French; fourth, fifth and sixth grade music; fourth and fifth grade art. In Pittsburgh, Philadelphia, Detroit, St. Louis, Seattle, St. Paul, Minneapolis, Denver, Birmingham, Miami and many other schools, courses are offered in foreign languages and science at the fourth, fifth and sixth grade level.

St. Paul furnishes a very dramatic example of the impact of television instruction. In the 1959-60 school year, 59 elementary students received instruction in a foreign language. In the 1960-61 school year, 30,000 students in the fourth, fifth and sixth grades received daily Spanish instruction by television at a cost of $1.22 per pupil per year. Twenty-seven districts and several parochial schools cooperated in the $39,000 annual budget. The result has been a significant educational development in the St. Paul area. Teachers who never before had taught Spanish have been assisted in developing a degree of skill in Spanish instruction. The TV teacher carries the major burden in the classrooms of these teachers. The TV teacher is seen by television in the classrooms on Mondays, Wednesdays, and Fridays. On Tuesdays and Thursdays, audio tapes prepared by the TV teacher are used in the classroom for drill purposes. On Thursday afternoons, following the school day, the TV teacher conducts a special program for the classroom teacher.

In Anaheim, California, seventeen elementary schools are linked by cable for instruction in social studies, science, music and Spanish. TV is a part of the redeployment of the fourth, fifth and sixth grades as outlined in the Stoddard plan shown in Figure 4. Anaheim reports great success in its experiment. Achievement of students involved in the plan is higher than that of students in the conventional organization.

Among other experimentation with science programs is that of San Francisco where the public schools are attempting to discover if elements of science traditionally taught in the junior and senior high school can be taught at the elementary grade level. In some San Francisco schools, fourth and fifth graders are engaged in chemistry experiments heretofore found only in junior high or senior high chemistry classes. In the ten school districts surrounding Lincoln, Nebraska, the Nebraska Educational Television Council cooperates to bring to the fourth, fifth and sixth grade classes weekly demonstrations of science principles using experimental apparatus and materials otherwise unavailable to the classroom teacher. Fourth graders learn about jet propulsion, flight, weather, health and electricity.

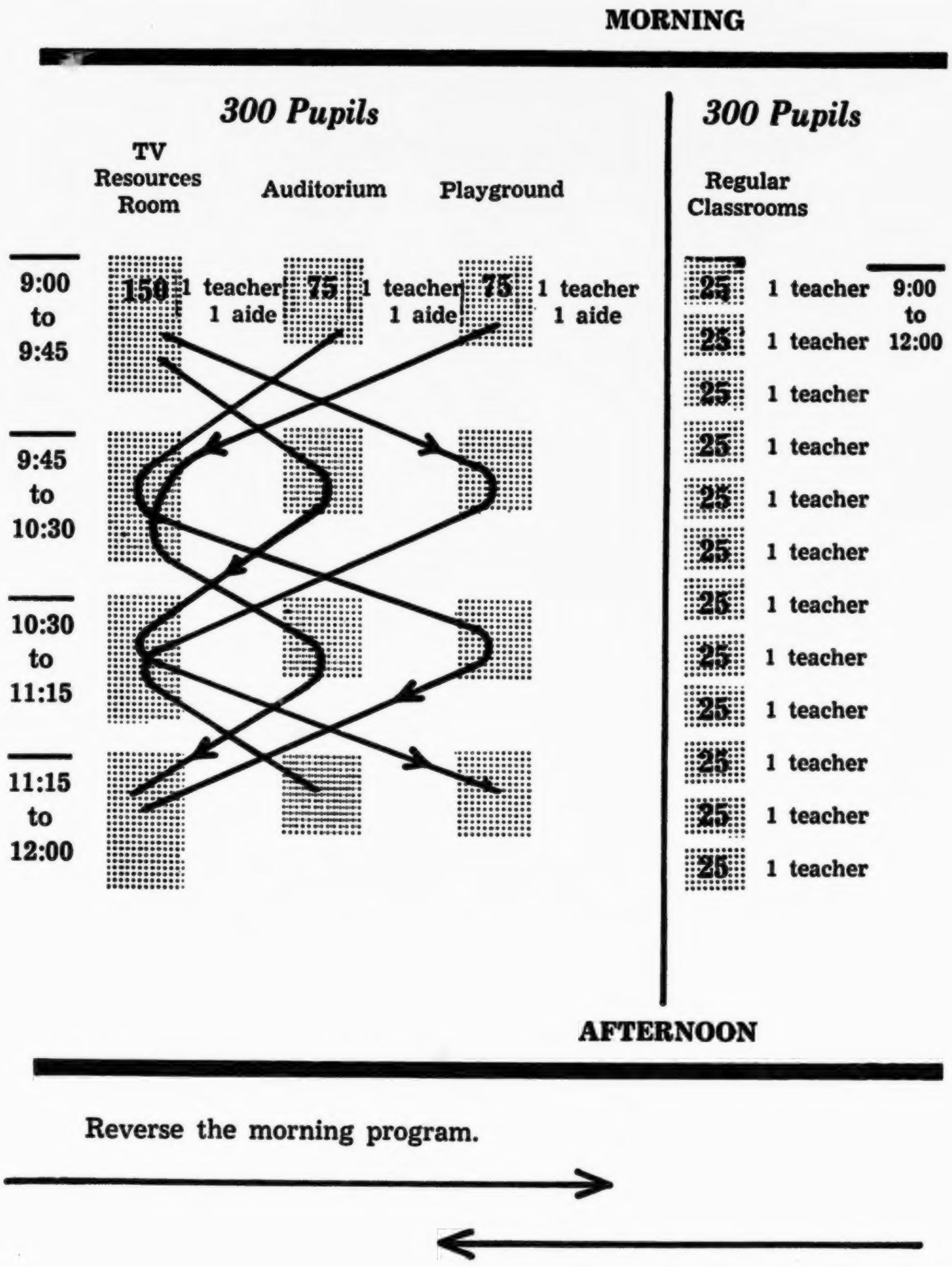
In addition to science and foreign language instruction, at the fourth, fifth and sixth grades, a wide variety of course offerings in the social sciences also is being broadcast into classrooms throughout the United States. Televised state history courses are being developed in several states.

Junior High

At the junior high school level, it is becoming apparent that television offers direct advantages in the areas of science and social studies as well as in foreign languages and other special course areas. In the Miami, Florida, school system, large class instruction with classes consisting of 300 to 400 pupils are proving practical. Television allows a concentration of teacher effort not

A plan for 600 elementary pupils

(Grades 3 to 6 inclusive)


MORNING
300 Pupils
TV Resources Room
Auditorium
Playground
300 Pupils
Regular Classrooms
9:00 to 9:45
9:45 to 10:30
10:30 to 11:15
11:15 to 12:00
150
1 teacher
1 aide
75
1 teacher
1 aide
75
1 teacher
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9:00 to 12:00
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AFTERNOON

Reverse the morning program.

FIGURE 4. The Stoddard plan for redeployment of students and teachers to take advantage of ITV.

By permission from the author: Stoddard, Alexander J., *Schools for Tomorrow: An Educator's Blueprint,* Fund for Advancement of Education, N. Y., 1957, p. 45.

possible in the conventional situation; the classroom teacher supplements the information presented by the TV teacher. The use of auditoriums and gymnasiums for television classes has made possible the use of existing classrooms to accommodate increased enrollments.

There is considerable use of television in the junior high grades in Hagerstown where biology, mathematics, science and foreign languages are taught by TV. In addition, parts of "core" courses in English and social studies are taught by TV at each grade level. The Hagerstown mathematics program includes two levels of instruction for the seventh and eighth grades: an advanced program for the academically-talented and a program for average students.

TV in the Secondary School

Significant experiments have been carried out in high schools and a number of high schools are using television instruction as a permanent part of their educational program. In the large high schools in Miami, Los Angeles, Detroit, and other cities, English, history, science, mathematics and social studies are being taught by television. Television instruction provides an opportunity to take advantage of the skills of the TV teacher and the classroom teacher. Expert presentation and attention to individual students plus discussion by small groups provide improved learning situations. Scheduling problems have been solved where sufficient energy and imagination have been devoted to a solution of these problems.[1] The Stoddard Plan is being used in significant experiments with scheduling at the high school level in Milwaukee, Des Moines, Denver, Ogden and Oklahoma City.

In Tampa, Florida, biology instruction by television is very popular with high school students. The school system reports particularly good results among students otherwise in the lowest quartile in achievement. Students in the upper quartile tend to be stimulated more toward individual study and research.

TV in Colleges and Universities

Pennsylvania State University pioneered in television instruction with closed-circuit television experimentation and basic research on the psychological aspects of learning through motion pictures and television. Today, Pennsylvania State University has three closed-circuit TV systems operating on its campus. Student, faculty, and administrative acceptance is reported gen-

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[1] See Figure 5.

A Daily Plan for Scheduling
Large Television Classes and Regular Classes

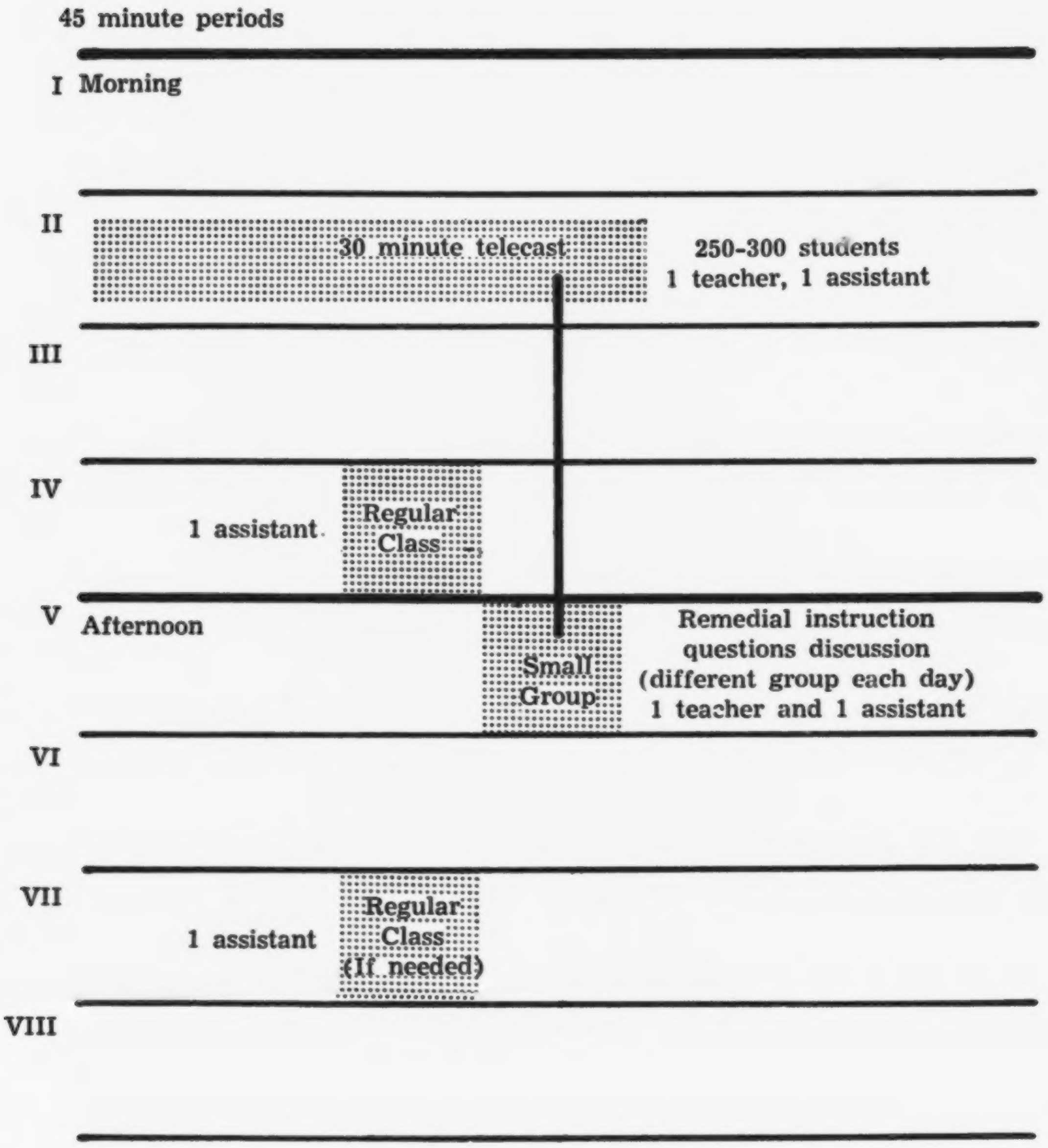
45 minute periods
I Morning
II
30 minute telecast
250-300 students
1 teacher, 1 assistant
III
IV
1 assistant
Regular Class
V Afternoon
Small Group
Remedial instruction
questions discussion
(different group each day)
1 teacher and 1 assistant
VI
VII
1 assistant
Regular Class (If needed)
VIII

FIGURE 5. The Stoddard plan for scheduling of large high school classes to take advantage of ITV.

By permission from the author: Stoddard, Alexander J., *Schools for Tomorrow: An Educator's Blueprint,* Fund for Advancement of Education, N. Y., 1957, p. 49. By permission from The Ford Foundation.

erally good and becoming better each year. While Pennsylvania State University reports televised instruction requires more time and resources than conventional teaching, thus resulting in more work for the TV instructor, it has proven itself economical in courses where enrollment exceeds 200.

The value of closed-circuit television in professional dental, medical, veterinary, and engineering schools has been demonstrated. Large numbers of dental students, for example, can see close-ups of dental operations which were previously visible only to small groups. In engineering schols, the hazards of radiation, explosion, and other dangers are eliminated through remote observation with closed-circuit television. Color television is becoming commonplace in medical schools.

A wide variety of courses has been offered by television in the 150 to 200 colleges having closed-circuit TV systems. Much has been of an experimental nature, but in those schools where experiments have continued for five or more years, it is safe to assume that while the experimentation can continue, the true experimental stage is past. Experiments have proven that course offerings in a wide area covering virtually the entire spectrum of college curricula can be successfully taught by television. While instruction at the elementary and secondary levels tends to concentrate on the major resource and supplementary enrichment type, at the college level there is less dependence upon the classroom teacher and greater dependence on the TV teacher. Many TV courses include discussion sections and other devices through which students can exchange information and have questions answered either by faculty or graduate students.

A significant experiment is currently being conducted in Texas where a number of colleges in the state system as far as 100 miles apart have been linked by television into a network that can take advantage of the storage capabilities of the TV tape recorder. Specialized courses are thus available in the smaller colleges.

Educational television stations located on college campuses are very frequently involved in cooperative efforts with local and state school systems. Alabama with its three-station network (soon to be expanded to four and later to six stations) offers a good example. Sixty-five per cent of the schools in the state are serviced by the present network where two of the three origination centers are located on college and university campuses at Auburn and Tuscaloosa. The University of Utah, the University of Washington, and many others are also engaged in this type of cooperative enterprise.

TV offers teacher training institutions a means of providing observational opportunities for student teachers. TV has been found less of an intrusion in the public school classroom and more effective than present conventional student-observation practices in providing teacher-trainees with opportunities to observe actual teaching and learning situations. Central Washington College of Education, San Jose State College and Montana State University are using TV in this manner.

The Midwest Program on Airborne Television Instruction

One of the most interesting and spectacular developments in the short history of instructional television is the Midwest Program on Airborne Television Instruction (MPATI) centered at Purdue University and supported in its initial, experimental stage by the Ford Foundation, the Westinghouse Corporation, and General Electric Corporation. This program has captured the imagination of educators across the country.

MPATI has successfully completed its first experimental stage, involving the development of the technical facilities for broadcasting tape-recorded lesson materials from an airplane flying at 23,000 feet over central Indiana. It is now engaged in the first year of instruction from the plane. Reception has been reported within a radius of 200 miles. Signals are transmitted on two frequencies in the ultra-high frequency band, channels 72 and 76. Lessons are produced at various production centers and educational television stations in the six-state area. Each course is taught by an outstanding teacher selected through nationwide competitive auditions and examinations. Each teacher is supported by consulting scholars, outstanding production facilities, and generous production budgets. The resulting lessons are outstanding not only in their educational content but also as examples of stimulating teaching. The tape-recorded lessons are carried aloft aboard one of two DC-6-AB aircraft each equipped with two tape recorders and two television transmitters. A special antenna has been designed to be lowered from the airplane when it is in flight.

Perhaps of greater significance is the organization which has been necessary among the 13,000 schools and colleges within the broadcast area of the MPATI transmitters. When it is realized that six state superintendents of public instruction and 4,000 districts including an enrollment estimated between five and six million children are involved in the project, it can be seen that the administrative and educational considerations are very complex. Due to superior organization and a very careful involvement of all elements within the six-state area concerned with the use of ETV, the MPATI experiment seems headed for success. During the 1961-62 school year, seventeen courses ranging from elementary to college level are being broadcast from the MPATI airplanes.

CHAPTER 3

Research in Televised Instruction

In its short history, educational television has been subjected to intensive research. Most of the research has compared instruction by television with instruction by conventional means. Some research has explored the attitudes of students, faculty, parents and administrators toward TV instruction; very little has explored methodology in TV instruction.

Effectiveness of Teaching With TV

The individual interested in the use of television in the classroom immediately asks the question, "How effective is television teaching?" Results vary with educational level and subject areas.

Elementary

Some 50 studies have compared the achievement of students taught by television and students taught by conventional techniques. Most of these studies were made in the middle grades. Allen reports on 45 such studies.[2] Eleven of these showed TV instruction to be superior, three showed the conventional method to be superior, and 30 showed no significant difference in achievement between the two methods. Studies in which TV instruction is reported superior show that TV students out-perform students in conventional programs in the ratio of 7 to 2.[3]

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[2] Allen, William H., *Television for California Schools,* a report of a study made for the California State Department of Education, bulletin of the California State Department of Education, Vol. XXIX, No. 4, Sacramento, April, 1960.

[3] Coombs, Philips H., *Airborne Television Instruction and Better Quality Education,* The Ford Foundation, December, 1960.

The National Program in the Use of Television in the Public Schools, a nation-wide experiment financed by the Fund for the Advancement of Education, involved 250 school systems during the years 1957-58 and 1958-59. This experiment is continuing, although test results are not available for subsequent years. In 1957-58, comparisons of TV classes versus conventional classes showed 68 favored television students and 42 favored control groups. In 1958-59, the comparisons in favor of television grew to 97 while those favoring control groups numbered 44. Again, if the studies showing significant differences in favor of television are isolated, TV students outperform conventional students in a ration of 3 to 1 in 1957-58 and nearly 4 to 1 in 1958-59. Allen found 24 studies comparing junior high school student achievements.[4] Here three favored television, two favored the conventional situation, and 19 showed no significant difference or an equivalent achievement. These comparisons were concerned with large class viewing situations predominantly.

Secondary

A considerable number of researchers have studied high school situations in which instruction by television is compared with conventional instruction. Allen reports on 67 studies made in 16 school systems.[5] Fourteen of these studies significantly favored classes taught by television. Five favored the conventional classes. The remaining 48 studies reported no significant difference. These findings are consistent with those at the elementary level.

A considerable number of the schools and classes reported in the National Program in the Use of Television in the Public Schools are secondary schools. These studies, Coombs reports, cover 57,431 TV students and 38,758 students in control classes taught by conventional means. Coombs' report shows 165 studies in favor of the television student and 86 in favor of control groups.[6]

Higher Education

Colleges and universities pioneered in experimental research in television instruction. Many of these studies compared classes taught by television with similar classes taught by conventional means. Several hundred such experimental studies are summarized by Kumata.[7] Pennsylvania State University's systematic inquiry into the efficacy of television instruction began in 1954 and was the follow-up to a number of years of study in motion picture research. The studies from 1954 to 1958 involved some 3,700 Pennsylvania State students registered for one or more of thirteen courses taught by closed-circuit TV. For purposes of experimentation, the television courses were kept as similar as possible in content and teaching method to those in the conventional classrooms. Twenty-nine out of the thirty-two controlled comparisons showed no significant differences in achievement. Television proved to be as efficient a means of teaching as the conventional classroom.

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[4] Allen, *op. cit.*

[5] *Ibid.*

[6] Coombs, *op. cit.*

Considerable criticism has been leveled at television instruction as making impossible the normal interaction between professor and student. "Feedback" provisions are not normally available in the television situation. The addition of talk-back systems between classroom and TV studio at Pennsylvania State University did not change the results of the experiments. However, as teachers have gained experience in presenting course material by television, they have found it possible to anticipate and answer many student queries and to include "feedback" provisions in the materials covered by small discussion groups or in written assignments.

Subject Areas

There is considerable interest among researchers in determining what subject matters seem to be best suited for television instruction. The Ford Foundation reports on 159 studies at various levels from elementary through college and divides them by subject matter.[8] Figure 6 presents a graph of the results of these studies. Again, the typical result is obtained—a large majority of studies in each subject classification shows no significant difference between TV teaching and conventional teaching. However, when significantly different results were obtained, as in social studies, science, languages, and mathematics, achievement favored television instruction over the conventional type by ratios ranging from 9 to 1 to 7 to 5.

The Hagerstown, Maryland, TV experiment shows the decided

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[7] Kumata, Hideya, *An Inventory of Instructional Television Research,* Educational Television and Radio Center, Ann Arbor, Michigan, 1956.

[8] Smith, Mary Howard, Editor, *Using Television in the Classroom,* Midwest Program on Airborne Television Instruction, McGraw-Hill, New York, 1961, p. 11.

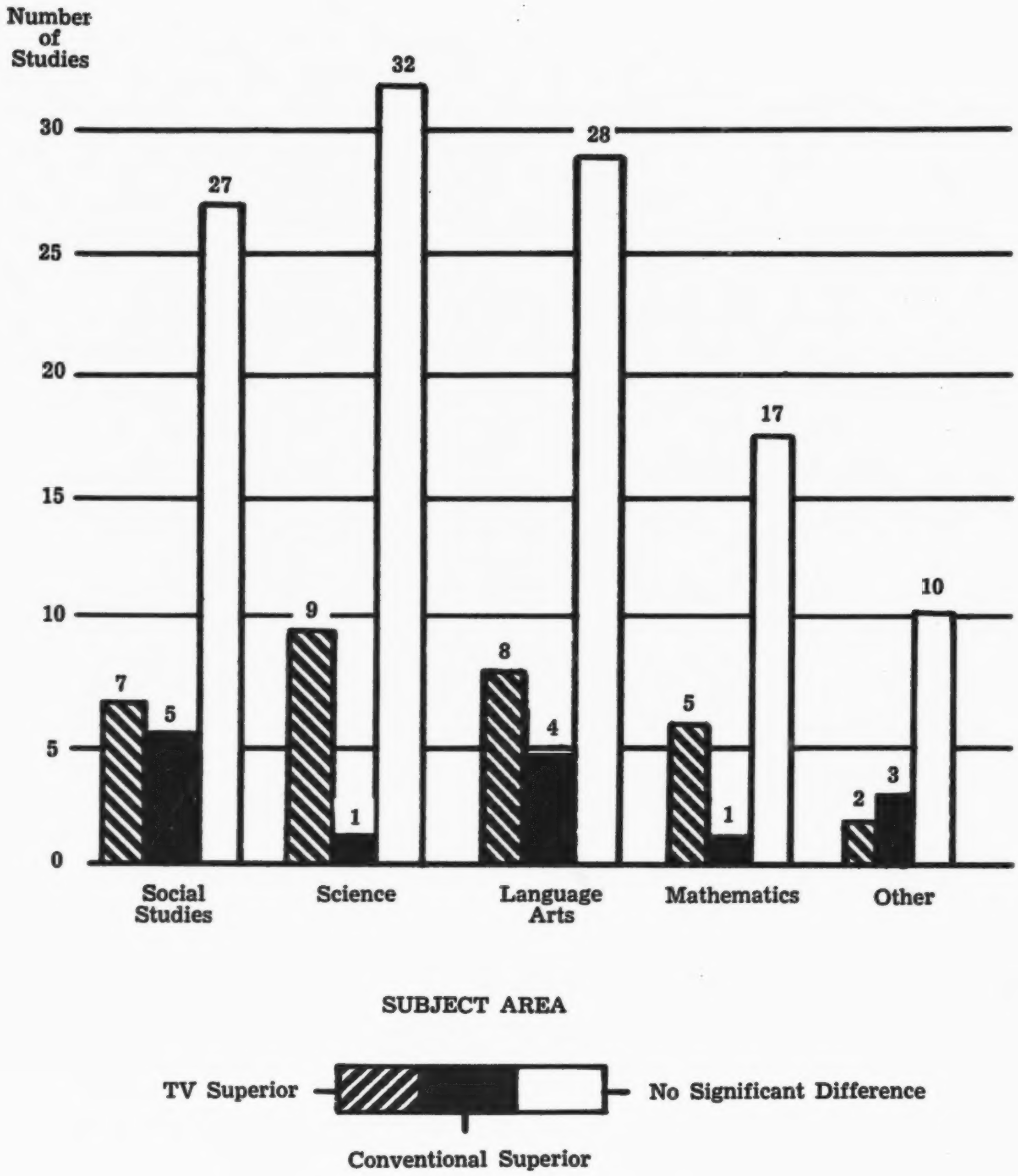


FIGURE 6. Composite of results of formal research experiments undertaken during the past decade comparing achievement by TV and conventional methods in several subject areas.

By Permission from The Ford Foundation

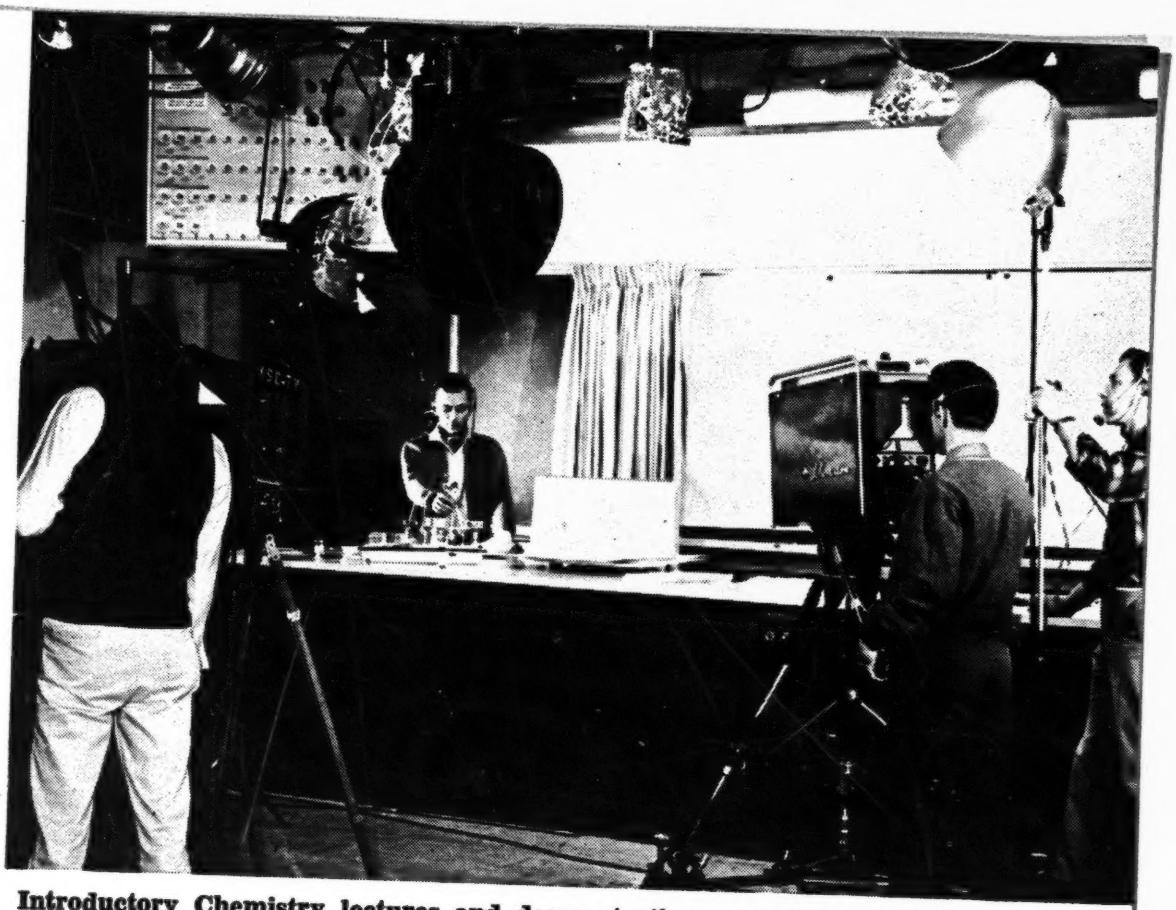
impact of television teaching of mathematics on the achievement of grade school children. The Iowa Tests of Basic Skills have been given to all Hagerstown sixth graders each year. Prior to the use of televised instruction 15 per cent of pupils finishing sixth grade arithmetic qualified for eighth grade work. After one year of televised instruction, 33 per cent qualified. At the end of three years, the sixth grade group was tested and 49 per cent were found ready for eighth grade work. The result has been that Hagerstown has revised its mathematics curriculum to allow students to move at a faster pace.

Attitudes Toward Instructional Television

Of importance to all teachers is the attitude of the student. A frequent question is, "How well do students like to be taught by television?" Equally frequent is the question, "What is the attitude of the teacher toward TV instruction?"

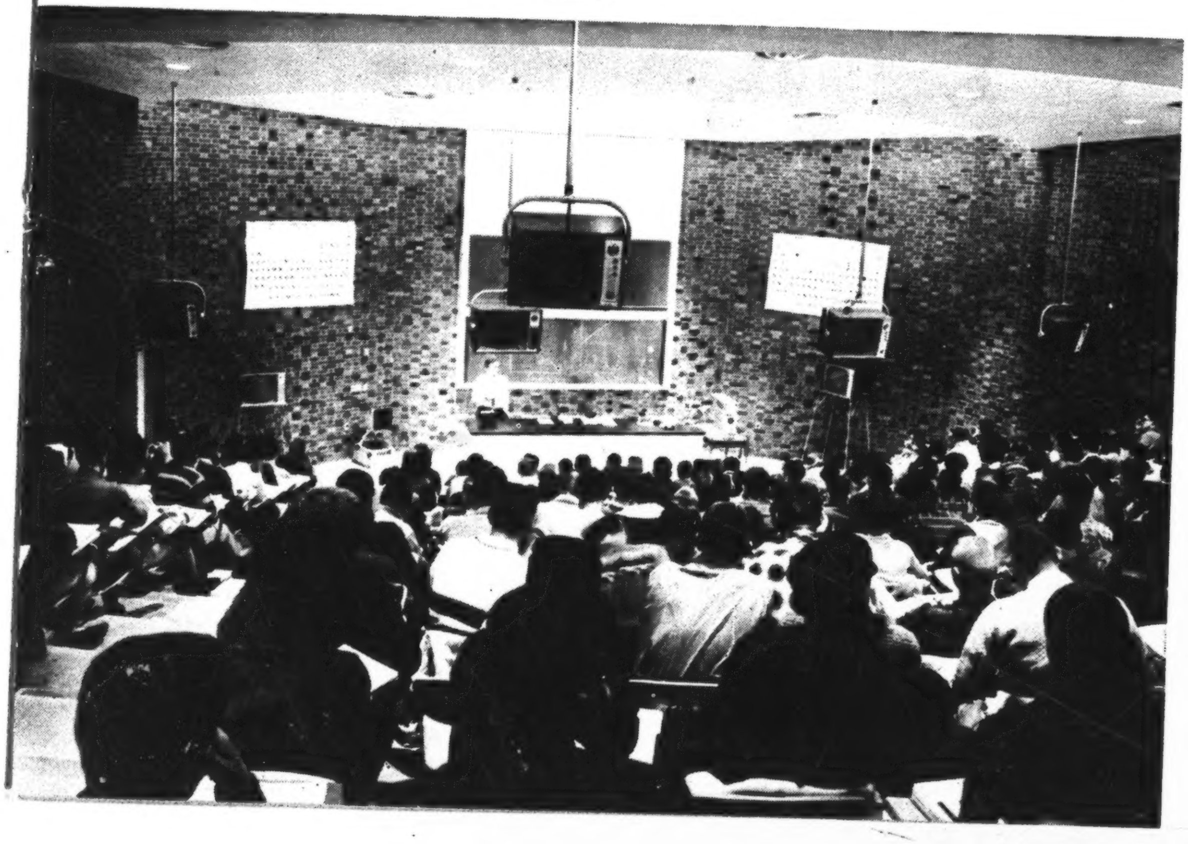
Student Attitudes

In general, research shows that students are slightly more favorably inclined toward conventional instruction than toward television instruction. Wide variation exists, however, from course to course and from school to school. Variation of this type suggests that non-television factors are influencing student attitudes. Most schools and colleges using television report that student reaction to television tends to become more favorable after continued exposure. At Pennsylvania State University an average of 78 per cent of the students taught by TV thought that the use of television was either "very good" or "fairly good" as a means of teaching courses with large enrollments. In an experiment in which students were given instruction by television and in face-to-face situations by the same teachers, and subsequently given a choice between the two methods of instruction for the remainder of the semester, students chose television 6 to 4 over face-to-face instruction by the same teacher in a large class. Studies at other institutions tend to substantiate these findings. Interestingly, students who do not favor television seem to learn as well from it as students who favor it. A caution should be noted: since the measurement of attitudes is very difficult at best and is a subjective response, measures of attitude must be carefully analyzed. Non-television factors frequently affecting measures of attitudes toward television are: attitude of the teacher, availability of critical analysis from staff members and other faculty, attitude of fellow students, and perceived reasons for televised instruction being used.



Introductory Chemistry lectures and demonstrations at Montana State College are produced in this studio in the Chemistry building. Lesson materials are transmitted by closed-circuit to lecture rooms in an adjacent building and to chemistry laboratories.

Television receivers suspended from the ceiling in this large lecture room at Montana State College can be fed signals originating in the TV studio or coming from the small, teacher-operated camera located in the small cabinet in front of the lecturer's table. In the latter use the TV system provides large closeups of materials otherwise too small for all students to see clearly.



At Montana State College, freshman chemistry was taught by closed-circuit television during the 1959-60 and 1960-61 school years. While students in the television sections achieved as good scores in tests as did students in small-class control groups, a majority of students during the first year reported a negative attitude toward television instruction. In the second year, though no formal testing of attitudes was made, a reversal of the former year's experience of drop-outs from the class was observed, and the increasing enrollments in the televised course during three terms indicates a factor outside of television at work in determining the student attitude exhibited the first year.

Hagerstown reports TV instruction is treated by grade and high school students as a very commonplace and usual thing. Some antagonism was perceived early in the experiment, more among high school students than elementary students. After five years of instructional TV, this antagonism has almost completely disappeared although it is reported that failing students sometimes use TV as a scapegoat.

Teacher Attitudes

The most extensive study of teacher attitudes toward television at the college level is being conducted at the University of Oregon.[9] The attitude of University of Oregon professors who have taught television courses differs significantly from that of faculty members generally. Though favoring continuation of experimentation with television instruction, a substantial proportion of teachers indicated more resistance toward reception of courses from outside the institution than toward courses originating from their own institution. Only a small percentage of faculty members indicated that television should have extensive future use in education. Only a quarter of the faculty members indicated a willingness to experiment personally with television. Faculty members who have taught on television found that they and their courses were adaptable to the medium. They felt that there was a gain in terms of preparation and quality for their presentations. Three of the seven professors who taught by television felt that TV had great possibilities for their specific courses. The professors generally did not see an immediate need for inter-institutional exchange of instruction by television. The Oregon experiment points out that a considerable amount of experimentation in television should be carried out to determine its potential on college campuses.

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[9] Starlin, Glenn and Lallas, John, *Inter-institutional Teaching by Television*, Oregon State System of Higher Education, Eugene, Oregon, March, 1960.

Since the above-mentioned study in 1960, the Oregon State System of Higher Education has established an inter-institutional television course in general psychology. The course has been developed by faculty members from all institutions for presentation to any unit of the State System which cares to incorporate the TV broadcast as an aid to instruction. This inter-institutional plan is based on the premises that students will benefit from acquaintance with a wider range of teachers and of interesting ideas and may develop more independence in thinking and be more highly motivated to seek new ideas through reading, and that instructors, relieved from routine lecturing and the demands of routine testing, will have more energy and time to devote to diversifying teaching methods, individual student counseling, research and professional growth.

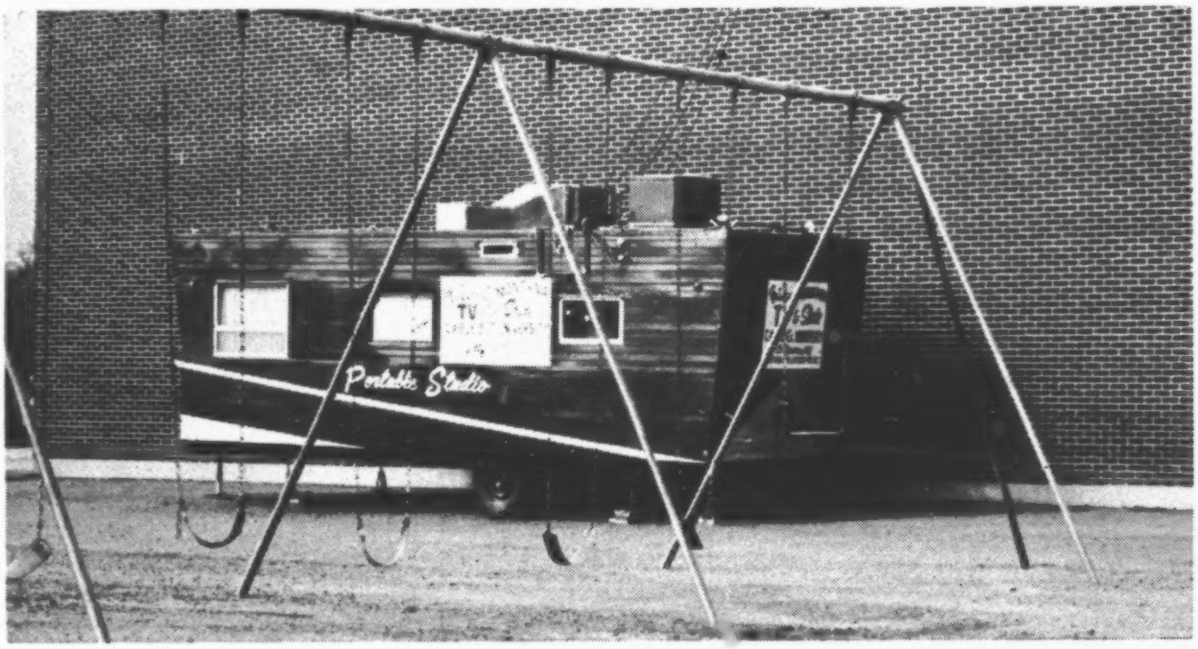
At the public school level, there is considerably more positive evidence that a high school or elementary school staff with experience in television accepts this medium as one of the ways in which education can be improved. The Anaheim, California, school system, in an experiment linking seventeen schools by closed-circuit television for instruction in the social sciences, foreign language, and music, found almost complete acceptance on the part of the general faculty and complete acceptance on the part of classroom teachers actually using television. Use of television was carefully planned with the staff of all schools participating in the Anaheim experiment. This factor has been an important one in a number of other experiments as well. Superintendent William M. Brish of Hagerstown, Maryland, reports overwhelming acceptance of television by the faculty of his county school system. Philadelphia, Detroit, Pittsburgh, Miami, Denver, and other school systems report similar experience.

Class Size and TV Instruction

The nation-wide experiment in large-class instruction by television financed by the Ford Foundation has been specifically aimed at the question, "Can television assist in large-class instruction?" This experiment over the past four years has involved 200,000 students in 800 representative schools—elementary, junior high, high school, urban and rural. The results are favorable as indicated earlier. Television lends itself in these experiments to a re-scheduling of classes to take advantage of superior instruction by well-qualified teachers. It has led to the solution of school building and enrollment problems in many situations. Test results of 251 comparisons showed 165 favoring television and 86 favoring control groups. In the 90 cases where

Two cameras provide pictures of the fifth grade class in a Missoula School District Number One school for transmission to Montana State University's School of Education. One camera, mounted on a fixed stand in the front, right corner of the room gives a wide-angle picture of the whole classroom. The other camera is operated by a cameraman and is fitted with four lenses including a zoom-lens for close-ups of individual students and their work.

The trailer parked alongside the school contains the control facilities and power equipment for the operation of cameras and microphones. The trailer and its equipment are on loan to Montana State University from the Missoula TV Cable Company.



Video and audio controls in the trailer are shown here. The operator is in phone communication with the professor in the Education class. He can direct the cameraman in the school classroom and select pictures for transmission to the Education class as instructed.

Picture and sound travel through cable to the MSU campus where the college class can observe the grade school class in operation and discuss it without disturbing the classroom. A further advantage over the conventional visitation system is that all students see and hear the same class and thus have a common basis for discussion.

a difference in achievement was statistically significant, 69 of these differences favored television classes. Because of the careful planning associated with television instruction, TV teachers found they could cover much more ground in less time than they could by conventional methods. Furthermore, television allowed these schools to provide far richer experiences than had been possible before. A side effect of these experiments has been an increased awareness of school problems and interest in the solution of school problems on the part of the general public where these experiments took place. Typically, other school systems within the coverage area of television stations broadcasting lessons make use of these lesson materials.

Much remains to be learned about the techniques of teaching and learning in large-class situations. Classroom teachers have found they play an expanded role in instruction by this method. They report increased interest on the part of students and a development of skills in note taking and an increased ability to organize on the part of television students.

Techniques of TV Instruction

Since television instruction is a relatively new teaching method, comparatively little research has been accumulated in techniques of TV instruction. Generally, methods employed in conventional classrooms have been carried over into the television situation. Innovations and experimentation on the part of TV teachers continue to point up the necessity for better understanding of the requirements of the new medium. Teaching machines, new television teaching devices, and recorded instruction, although being used extensively, have not yet been studied extensively. Some of the challenges in this area are: the provision of adequate physical facilities for TV reception in the normal classroom, training TV teachers, training classroom teachers in TV utilization, integrating television into the total learning process, and reorganizing the curriculum for maximum advantage of TV.

CHAPTER 4

The Potential for ETV in Montana

The preceding chapters have outlined some of the experiences of other schools, colleges and states using instructional television. This chapter considers Montana's school needs and discusses possibilities for the use of educational television in Montana.

Need for Improved Educational Facilities and Offerings

Montana's population continues to grow. Our schools face growing enrollments and a continuing shortage of skilled teachers. Montana's geography and relatively sparse population continue to make the small school a necessity.

The Teacher Shortage

Numerous studies have been made of the supply of qualified teachers for the nation's schools. One such study estimates that by 1965 there will be need for nearly 350,000 more teachers than the 1,500,000 now in U. S. schools. While at the present time, Montana's elementary and secondary schools are not uniformly reporting difficulty in securing teachers for positions on their staffs, there are indications that in several subject areas, teacher shortages are acute. At the present time the demand for well-trained science teachers in Montana schools is greater than the supply. Schools find great difficulty also in finding teachers of foreign languages, English, mathematics, art and speech. There is evidence that the reservoir of former elementary teachers who wish to return to teaching is diminishing. The present trend in high school enrollments indicates that the demand for teachers will increase and that the requirement of greater specialization in high school teaching will create especially difficult recruitment problems in the sciences, mathematics, and other special fields.

Growing Enrollments

U. S. Census Bureau figures for 1960 indicate that Montana's school systems may expect an enrollment increase of approximately 30,000 students by 1965. It is expected that 83,102 children will reach school age in the next five years while expected graduates from Montana high schools, those in the 14-19 age group during the same period, will total 50,767. Elementary school populations will increase in enrollment at a rate less high than during the past five years while high school enrollments will show a greater increase in total enrollment in the next five years than in the past five, although the percentage of increase will level off. The growth of school-age population is not evenly distributed around the state. Montana's urban population is increasing at a faster rate than its rural population. A number of counties, particularly in the eastern two-thirds of the state, have lost population in the past ten years. The 1960 census shows that for the first time in Montana's history, more than one-half of the state's citizens live in urban areas. The proportion of urban residents is expected to continue to increase as the state's larger towns and cities absorb population from rural areas. The increasing population pattern in Montana leads to problems of overcrowding in urban schools in the state.

The Growth of Knowledge

A relatively few years ago a grade school education was sufficient for the average citizen. The high school is now the norm and there is a growing trend for young people to expect to complete two to four years of college education. As the requirements of our society become more complex and as professional skills become more important to economic success, more education must be made available to a larger number of pupils.

The Small School

During 1961-62, there were 716 one or two-teacher schools in Montana including 576 one-room, one-teacher schools. It is no discredit to the valiant efforts of the small-school teacher that the demands placed on her often exceed her training and ability. Despite consolidation patterns, Montana will, for the forseeable future, require many small, rural schools because of its sparse population and difficult terrain.

The Potential for Use of TV in Our Small and Isolated Schools

Even a highly qualified, well-trained and dedicated teacher finds grave limitations in her abilities when she is required to teach eight grades simultaneously as is the case in our many one-room schools. A teacher in such a school needs all the assistance she can be given through modern methods and modern media. Although films, slides, textbooks, and other aids to instruction are available to this teacher in varying degrees, the potential of these media can be further enhanced by the addition of the latest of the educational media, television. Through television, the small school teacher can be assisted by specialists in many fields. Instructional assistance and laboratory facilities, resources otherwise unavailable, can become part of her teaching program.

In illustration of the potential of instructional television for the small schools of our state, consider, for example, the benefits available to the students in rural Montana schools of a series of televised science lessons. Skilled teachers of elementary science are available from the staffs of some of our public schools. Specialists in the various fields of science at our institutions of higher learning are available as consultants. Laboratory facilities and demonstration materials are available to make possible outstanding demonstrations of science experiments not now readily available to the small school.

Similar illustrations can be drawn for subject areas other than science. At the present time, an excellent course in elementary French is available on film and TV tape recording. Such a series could be originated at a central point and distributed to schools over the entire state. A number of such courses are now in the planning stage. The television lessons being prepared for the Midwest Program on Airborne Television Instruction are available for use in a system such as described here. Within the next five years, many more well-planned and well-taught television lesson series will be available.

The Potential for Use of TV in Our Urban Schools

School populations in the urban centers of Montana are growing rapidly. The many American schools which have participated in the Ford Foundation's National Experiment in Large-Class TV Instruction have proven that television can be used to obviate the necessity for split shifts. This technique centers around the use of auditoriums, school cafeterias, and large study halls as classrooms. Into these classrooms are telecast lessons suited to lecture-demonstration type presentation. During the time these large rooms are in use, regular classrooms are freed for conventional instruction periods. Through such techniques the Miami, Des Moines, Detroit, Philadelphia, and other large school systems have partially solved their enrollment problems. In Ogden, Utah, the Weber County High School solved its over-enrollment problem with this method.

By using the facilities available on local commercial TV stations in Montana's cities, by installing closed-circuit TV systems, or by establishing educational television stations, Montana's urban areas might similarly solve a significant problem associated with overcrowded schools.

Like small schools, large schools in Montana and elsewhere in the nation, are experiencing difficulty finding foreign language, art, music and science teachers to teach an expanded curriculum. As has been pointed out, several large city systems have used television to distribute the instruction of one teacher to many classrooms.

Significant also in schools of all sizes is the challenge of providing accelerated instructional programs for "gifted" students. Typically, these students are not concentrated in one school but are enrolled in small numbers in many schools. Hiring special teachers or establishing special classes for the benefit of these comparatively small groups is costly. However, television offers a means of providing accelerated instruction for our gifted young people.

The Potential for Use of TV in Our Colleges

Like many other states, Montana is faced with growing college enrollments and difficult problems of finance. Each institution must of necessity offer the wide range of general courses necessary for a good collegiate education. On the other hand, duplication is expensive and recruitment of teachers with adequate qualifications is difficult. Television offers an opportunity to distribute the offerings of one campus to other campuses, particularly in courses of a special nature. The successful *Continental Classroom* course broadcast by NBC-TV nationally for the past four years is an example of the exchange of college level instruction from one institution to dozens of institutions. The Western Interstate Commission on Higher Education has begun exploration of the potential for exchange of instruction among its constituent institutions. A sizable library of college-level instruction is already available through the National Educational Television and Radio Center and the affiliated ETV stations of N.E.T.

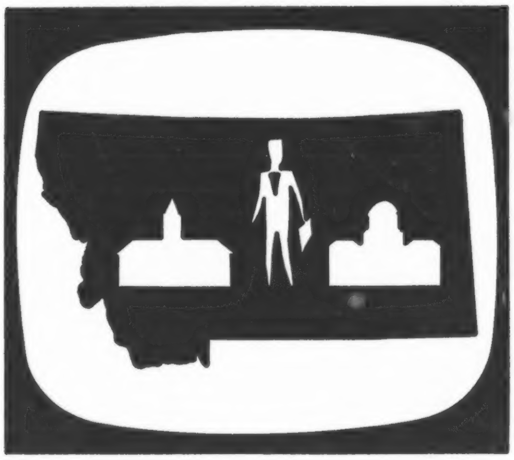
The use of closed-circuit television by colleges and universities has been directed to the solution of several different problems—most obvious is the problem of large enrollment classes which can be efficiently taught simultaneously by television.

Television also offers distinct advantages when coupled with the TV tape recorder or the kinescope film recorder for the storage of instructional materials. Many parts of the instructional process at the collegiate level as well as at other levels are repeated in unchanged form term after term and semester after semester. Through the medium of television storage such demonstrations and other instructional materials can be recorded once and repeated frequently. The resultant saving in faculty time and energy can be applied to the development of better and more perfectly-produced demonstrations and to other teaching responsibilities.

The Potential for Use of TV for Adult Education and Extension

Adult education and extension work is a function of the educational system of Montana. In the past, this work has included on-campus courses in colleges and high schools and extension courses conducted off campus by college teachers. A potential exists for the enlargement of the benefits of this activity through the broadcast of televised courses. Extension courses by TV have a long history. The earliest experimental televised courses were intended for home consumption. During the past decade, these courses have multiplied in scope and numbers. Courses in the practical arts such as accounting, home economics, auto mechanics, gardening, fly fishing, typing, wildlife, and others have proven extremely popular with the public. The more esoteric subject matters such as religions of the world, philosophy, political science, Shakespeare, Japanese brush painting, music appreciation, and art have proven popular. Specialized professional instruction for engineers, accountants, businessmen, teachers, lawyers, doctors, and dentists has found wide acceptance. The strength of a great number of institutions of higher learning has in part been based on the concept of extending the impact of the university to all parts of the state. Television is a natural means for the continuing education of the adult citizens of Montana

CHAPTER 5



Instructional Resources

At the present time, Montana has significant instructional resources that could be organized for television use. For example, the staffs of the State Superintendent of Public Instruction, the University of Montana and the elementary and secondary schools of the state include consultants and skilled teaching personnel in all subject areas. The State Film Library, a division of the State Department of Public Instruction, has many ETV films currently available, and a number of other films that could be cleared for TV use. In addition, the personnel and facilities of many other state offices might, through television, offer informational services to schools throughout the state.

Nor should Montana overlook the many instructional resources available to it from sources outside the state. Scattered across the nation are 62 educational television stations and several hundred closed-circuit television installations. Each of these produces televised instruction and is a potential source of assistance for Montana ETV development. In the year 1960, 267 live television courses at the elementary level, 145 at the secondary level, and 157 at the college level were produced by ETV stations. In addition, a considerable number of courses were being produced by closed-circuit TV systems at all levels. A study by Meierhenry and McBride[10] indicates that the number of live courses has continued to increase since 1957. Of significance to Montana education is the fact that a substantial amount of recorded instructional programming is available. Furthermore, a great body of material is potentially available. A total of 453 recorded courses are cataloged by Meierhenry and McBride. This does not include the library of kinescoped and tape recorded courses at the National Educational Television and Radio Center in Ann Arbor, Michigan. A catalog, "Instructional Utility and Analysis of 319 Educational Television Programs," prepared by the University of Indiana lists only a small part of the supply of educational programs on film and tape stored in the library of the N.E.T.R.C.[11]

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[10] Meierhenry, W. C. and McBride, Jack, *A Study of the Use of In-School Telecast Materials Leading to Recommendations as to Their Distribution and Exchange,* Lincoln, Nebraska, University of Nebraska, 1960-61.

The Midwest Program on Airborne Televised Instruction has announced its recorded lessons will be available to other TV systems. The availability of such superior instructional materials is a resource for Montana education.

Montana's Existing Television Facilities

Commercial Stations, Translator Stations, Community Antenna Systems, and Microwave Relay Systems

The state of Montana has a considerable system of television facilities of various types already in operation in the eight commercial TV stations and the large number of community antenna systems, translator stations, and microwave relay systems operated by private concerns. It has been estimated that 80 to 85 per cent of the homes in Montana are now receiving television signals from one or more Montana TV stations. The probability that the eight commercial stations will in the future be linked by microwave will make it possible for a program to originate in one part of the state and be seen in all parts. The use of this facility by education seems to be reasonable and possible. Most of the existing stations and systems have shown great interest in the development of classroom use of television. Station and community antenna system operators have been generous in volunteering use of their facilities to schools in their communities. It is logical that the development of educational television in Montana start with the use of existing facilities. The time will come when the availability of commercial TV will become more difficult to arrange and the needs of the schools will exceed the capabilities of the commercial facilities. Until such a time, the Montana educational communities can make use of the facilities generously offered them by various existing TV systems.

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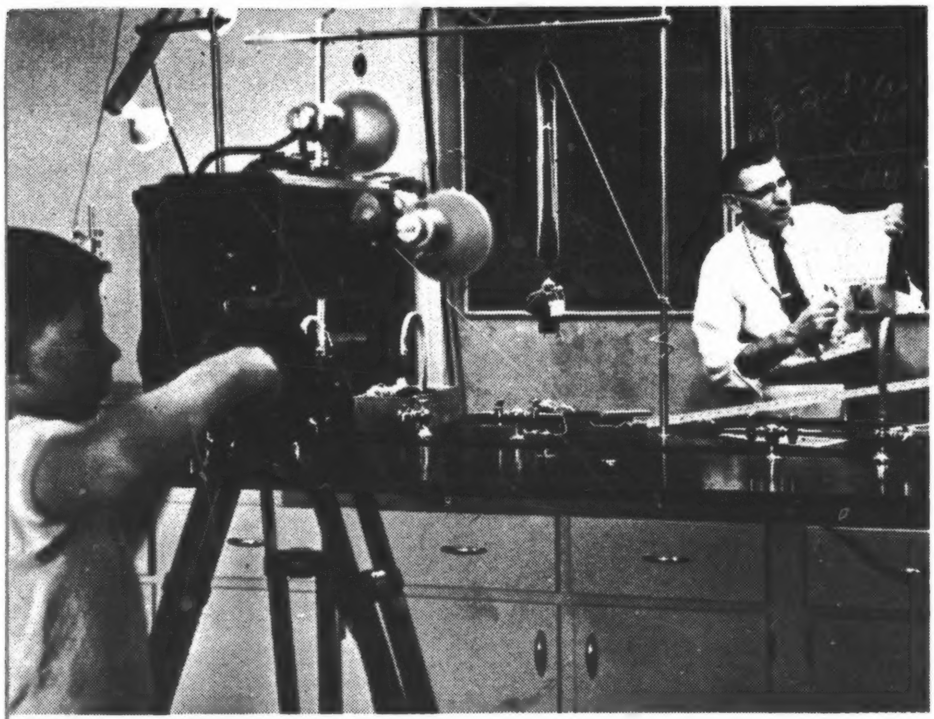
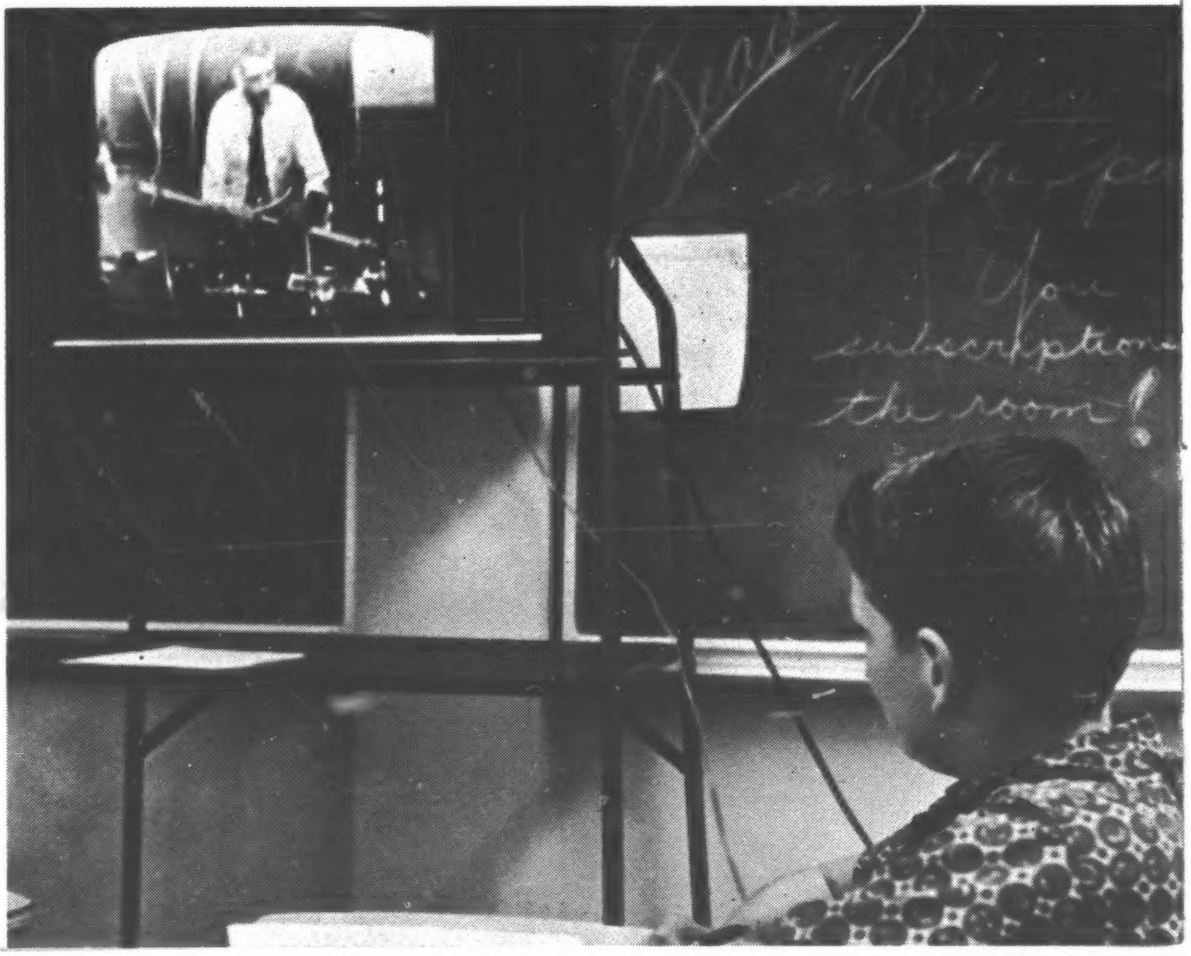
[11] Wright, Wendell W. and Cohen, Edwin G., *An Instructional Utility Analysis of 319 National Educational Television Programs*, Ann Arbor, Michigan, Educational Television and Radio Center, 1958.



The first public school in Montana to produce its own TV instruction was Kalispell Junior High School. Using equipment donated by Northwest Video Company and a converted classroom as studio, science demonstrations for the eighth grade are distributed by closed-circuit to all eighth graders simultaneously. An eighth-grader operates the zoom-lens-equipped industrial vidicon camera.

Seventeen classrooms in the Kalispell Junior High are equipped with receivers. The system is used to communicate with the public as well since it is connected to the cable serving the Kalispell area.



Cooperative Commercial-Educational TV Stations

One of the interesting possibilities lies in the cooperative operation of TV stations by commercial and educational interests. For example, Michigan State University owns and operates a TV transmitter, tower and antenna on channel 10 in Onondaga, Michigan, a few miles south of its campus in East Lansing. Half of each day the transmitter is leased to commercial station WILX-TV which operates studios in Lansing and Jackson. The other half of each day the transmitter broadcasts the programs of WMSB-TV from the university's studios on the campus. Two licenses have been granted for this operation. Each specifies hours of operation. Michigan State University uses the daytime hours plus one hour of prime evening time. WILX-TV uses the noon hour, the after-school hours and the late evening hours.

Such an arrangement seems possible in Montana between educational units and commercial broadcasters. The history of educational radio teaches an important lesson, however. Educators should be aware that such arrangements must be carefully contracted, for TV channels, like radio frequencies, will become more and more valuable and pressure will mount to convert part-time commercial stations to full-time commercial stations. Such pressure was difficult for the early educational radio stations to combat. But with careful planning and adequate financial resources, education could well find cooperative operation of TV stations a wise step at least in early stages of the development of ETV. However, such developments should not be allowed to jeopardize the continued reservation of channels for total educational use.

CATV Networks

Another possibility for instructional television lies in the growing development of cable TV systems in the state. The trend in Montana is toward a linking of the many cable systems now in operation. CATV operators have shown sincere interest in ETV. It may be possible that a state-wide network of cable systems with the attendant advantages of multi-channel operation will become available for the distribution of instructional television. A network is already operating which brings into Montana the signals of Station KUED-TV, the University of Utah ETV station.

TV and Film Facilities of MSU and MSC

Television facilities capable of producing instructional television have been developed at MSU and MSC. These studios offer potential for developing live TV and filmed television instruction.

The Six Montana ETV Reservations

The 1952 Sixth Report and Order of the Federal Communications Commission reserved 242 TV channels for educational use in the United States. One third of these were in the VHF spectrum, two thirds in the UHF spectrum. Currently, through the addition of other allocations, a total of 273 channels are reserved. Of these, six are located in Montana and should be considered among primary ETV resources. The designation of reservations in Montana are Miles City, Channel 6; Billings, Channel 11; Bozeman, Channel 9; Butte, Channel 7; Missoula, Channel 11; and Great Falls, Channel 23. It should be noted that five of the six reservations in Montana are in the VHF spectrum. It should also be noted that the UHF spectrum will continue to be available to education. The 70 channels in this spectrum provide abundant resources for future educational use. If Montana education is to develop the use of television, it must look ahead to the day when it will build stations on the channels reserved for education, and must consider the need for additional channels to complete coverage of the state's schools. The loss of Montana ETV reservations through dis-use would be unfortunate. Three cities, College Station, Texas; Weston, West Virginia; and Eugene, Oregon, have already lost ETV reservations on VHF channels.

The Potential for a State ETV Network

Tape and Film Networking

As ETV stations develop in Montana, or as closed-circuit television systems in schools develop in the state, the utility of interlinking the systems becomes apparent. Two principal means offer potential for this linkage. Least expensive, but most ponderous, is the possibility of networking by tape or film. This involves the distribution of programs and lessons on tape or film by mail or other carrier.

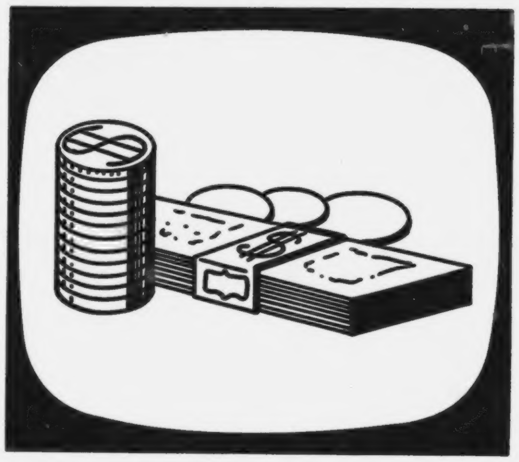
Microwave Networking

The second method is the use of microwave relay stations. Several common carrier microwave companies already in existence could provide one-way or two-way linking services between stations or systems in a network on a lease basis.

A survey of needs and costs involved in the establishment of a state-owned microwave system for use by the State Highway Department, Highway Patrol, Fish and Game Department and other state agencies has been authorized. Such a system if properly planned, might serve instructional TV purposes as well as the communications needs of other state agencies.

Commercial television stations in Montana have found it practical to build their own microwave linking facilities; such an alternative also presents itself for linking educational stations or systems. A decision between leasing microwave services or building separate facilities will require the careful consideration of many factors; initial and long-range costs, quality of service, reliability, site access, flexibility of scheduling, and others. In other states, sites developed by private power companies and commercial television interests have been made available to education for the location of their microwave relay facilities.

CHAPTER 6



The Cost of Various TV Alternatives for Schools

Several alternatives appear practical for Montana schools planning TV instruction. They range from small closed-circuit installations to complete ETV stations and networks. An additional alternative is the use of commercial TV facilities and use of ETV programming imported from out of state.

These alternatives are examined here on a cost-versus-utility basis.

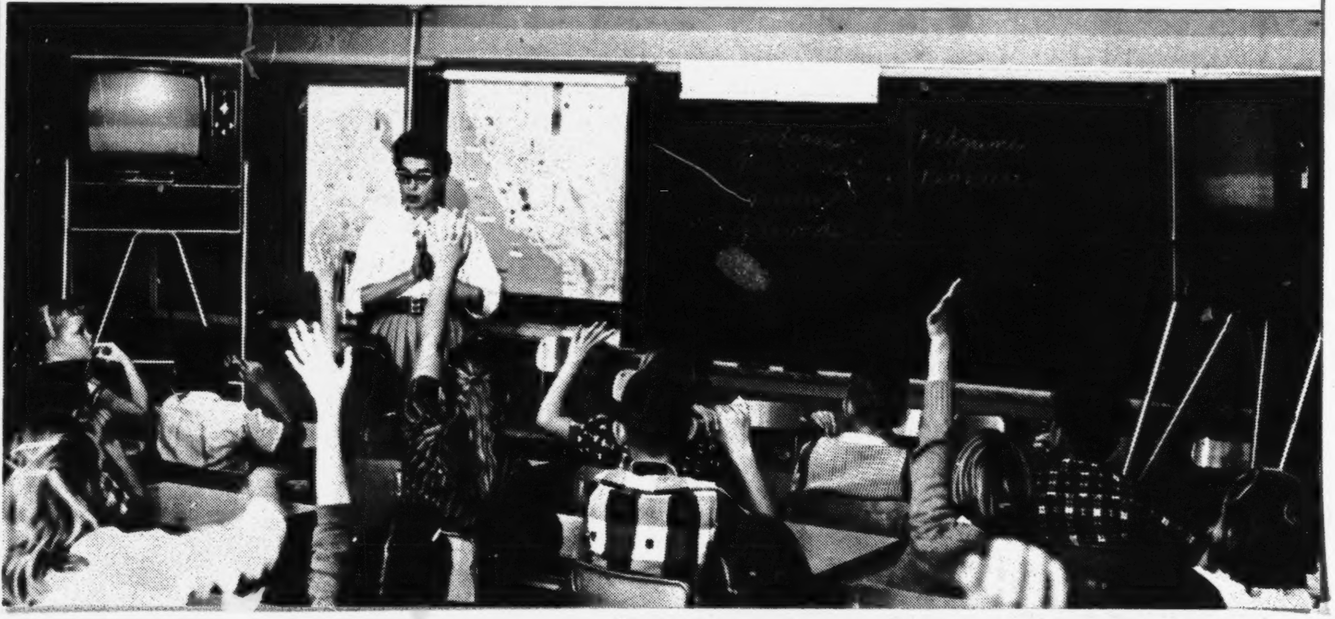
Closed-Circuit TV Instruction

The Small Closed-Circuit System as a Classroom Audio-Visual Aid

The simplest TV closed-circuit is an arrangement within a classroom connecting a TV camera with one or more TV receivers. It is controlled by the instructor and is used as a means of providing enlarged close-ups of lesson materials, printed material, drawings, demonstrations, models, microscope slides, and any other items available for use within the range of the camera. The camera is usually mounted overhead and is equipped with a zoom-lens which the instructor controls and which allows him to change the field of view from an area covering approximately six square feet to one the size of a postage stamp. Such a closed-circuit TV facility can be fitted on a small hand cart and wheeled from room to room. It can be set up in a few minutes since it requires only connection to an electrical outlet and arrangement of receivers and camera to suit the instructor's purposes. The cost of such a closed-circuit TV system ranges from $800 to $1,250 for a minimum system.

The Anaheim, California, Elementary School District's use of instructional television combines remote controlled and operator controlled TV cameras in its studios. Here a TV teacher presents a lesson in the California history and geography unit of the social studies course.

This Anaheim classroom is typical of thousands of classrooms across the nation in which television is being incorporated as a teaching medium. The follow-up by the classroom teacher is a vital part of the total instructional situation.



Inter-Classroom Closed Circuit

By extending the output of one or more television cameras, a closed-circuit system can be arranged among several classrooms in one building or in several buildings in an area. The community antenna systems in Montana are closed-circuit systems fed by external TV signals. Many America school systems use closed-circuit television to bring resource materials and complete courses into the classroom. A typical example is a closed-circuit system between an originating classroom from which science demonstrations can be fed to many other classrooms. Such a system requires one or more TV cameras, lighting equipment, microphones, and an audio amplifier, plus a TV modulator which transmits the signal through the cable to a number of television receivers. As the number of television receivers is increased, amplifiers are needed to make the signal sufficiently strong to serve the additional receivers. Such a system can be very simple and consist of but one camera, microphone and show-window lighting equipment. TV receivers currently available to schools range in price from $135 to $250, depending upon size and quality. Closed-circuit TV systems can make use of industrial-type TV cameras. The prices of very simple cameras without external synchronization range from $650 to $1,250. Studio-type vidicon camera chains range in cost from $5,000 to $10,000. The latter type provides better picture quality, more stability, and more flexible operating features. Professional quality image-orthicon camera chains range in price from $10,000 to $20,000. A minimum vidicon TV package for closed-circuit work in a school system can be purchased for approximately $9,000 plus the cost of receivers and distribution, and would include two industrial TV cameras, simple switching equipment and modest audio equipment. Cabling costs vary considerably because of varying distances which the signal must be fed. A rule-of-thumb cost estimate for TV cable transmission between buildings is $1,500 per mile. Within buildings when the TV signal must be distributed to a number of classrooms, a rule-of-thumb estimate for distribution systems is $40 per TV outlet.

In considering the costs of closed-circuit TV installations, it is wise to bear in mind that each installation is in effect a custom situation and requires specification of uses and extent before firm cost estimates can be given. Make-shift projection facilities can be devised by using ordinary motion picture and slide projectors picking up the image from a screen with the live TV camera. However, for extensive use of film and slides, a separate TV camera, a special TV-type motion picture projector and a multiplexer system is advisable. Cost of such a system will range from $5,000 to $15,000 for single projector operation, plus $2,400 to $4,500 for dual projector operation.

Using Commercial TV Facilities

Commercial TV Stations

Some of the equipment described above can be used to originate telecasts which are compatible with commercial TV station requirements if the equipment is of the type which transmits signals conforming to the specifications of the minimum requirements of the Federal Communications Commission; however, this is usually not the case with industrial-type vidicon equipment. If the closed-circuit equipment owned by a school is of the professional type (either vidicon or image-orthicon cameras with synchronizing signals included), signals can be transmitted via cable or microwave relay to commercial TV studios or transmitters. The additional cost of furnishing such signals to a commercial station amounts to the cost of the microwave transmission facility, which ranges from $5,000 to $12,000 per system, or cable connection at about $2,000 per mile. It is also possible to make use of commercial facilities by recording the educational signal on film or video tape at the school source, and transporting the finished film or tape to the station for replay.

In Montana, no TV stations are as yet equipped with video tape recording facilities. Thus kinescope recording (recording of TV signals on 16 mm film) becomes the only alternative at present. Kinescope recorders are highly technical pieces of equipment, ranging in price from $7,000 to $20,000 and requiring the services of a trained operator. Kinescope recordings are playable on ordinary 16 mm sound motion picture projectors and thus have the advantage of being usable in classrooms as ordinary motion picture films. At the present time, there is no kinescoping equipment in the state of Montana.

It is possible for a school to produce its programs in commercial television studios using the station's equipment. The broadcast signals are then received in the classrooms and used in the conventional manner. Such an arrangement requires a cooperative agreement between the school and the commercial television station with regard to the use of facilities and broadcast time. Montana TV stations have shown interest in the development of educational television and at the present time are willing to produce limited amounts of such programming. For example, KFBB-TV in Great Falls has for the past several years cooperated with the College of Great Falls by producing TV courses for credit. It is possible, furthermore, for schools to purchase time and facilities from commercial stations. However, it should be borne in mind that a commercial TV station has responsibilities to its mass audience; it is logical that such stations cannot devote large blocks of time to school telecasting, particularly at prime viewing hours.

Several of the Montana commercial TV stations are currently linked by microwave and it is technically possible to originate programs on one station and have them broadcast by one or more additional TV stations in other communities. It seems possible that within a short time all Montana's TV stations may be interlinked, thus making possible the distribution of TV programs of an educational nature over a system reaching most Montana communities. The important proviso of availability mentioned above will become increasingly a factor as the number of stations involved increases.

Community Antenna Systems

Signals originated in school television systems can be distributed through the existing cable facilities of the several community antenna companies in Montana. Such is the case in the cooperative arrangment which began in February, 1962, in Missoula. Spanish lessons are originated at the Montana State University TV Studio and distributed to the fifteen schools of Missoula Public School District No. 1 by the Missoula TV Cable Company. A similar system, using minimum industrial vidicon equipment operates in the Kalispell schools.

Some TV cable companies are currently linked by microwave relay systems; plans are currently being made for linking others. Assuming that a cooperative microwave arrangement could be worked out, it is feasible for program originations in one system to be distributed by other systems linked with it. The cost of such distribution depends upon the availability of channel space on the distribution systems and microwave relay systems. As long as there is available space and time, instructional television could be transmitted through such systems.

Building ETV Stations

An ETV station can be licensed to a school system, a college, or any other noncommercial educational organization which has as its purpose the broadcasting of instructional and educational programming without advertising. The cost of building an ETV station, like the cost of building a commercial TV station, depends upon the size of the area to be covered with a television signal, the quality of equipment used, and the size of staff employed. A minimum ETV station can operate with one camera plus a projection system for films and slides, a transmitter, antenna, and small staff. An ETV station can, however, also operate as a complete and elaborate TV station with multiple cameras, kinescope, or video tape facilities, high-powered transmitter with high gain antenna, and a complete staff. A low-powered small staff operation capable of originating a few hours of television programming of limited complexity can be built for $50,000 and staffed for a like amount annually. A few of the 62 ETV stations now in operation in the United States have begun on such an expenditure. At the present time, a half-dozen such small ETV stations are in operation. They report annual budgets ranging from $40,000 to $50,000.

On the other hand, most of the ETV stations in the United States are full-scale operations. Such stations cover large areas with high-power transmission equipment from studios with complete facilities and broadcast programs from mid-morning or noon until midnight. Such stations report capital investments up to one and a half million dollars and annual operating budgets up to $750,000.

ETV stations must be carefully planned in both the technical engineering sense and the operational sense. It is easy to multiply the costs of operating ETV stations by planning overly elaborate programs and program schedules. As the TV audience in classrooms and homes increases and the use of telecast lessons is spread over larger numbers of students, the economics of ETV station operations allows increases in power and complexity and lengthening of the broadcast schedule. At the present stage of development in the United States, it appears that ETV expenditures by stations and school systems using those stations will continue to grow. At the same time, new developments in transmission methods and TV production techniques should, together with growth in audience, bring new economies.

Networking

Linkage of production and transmission points by microwave is practical and is, in fact, already available through common carrier companies already in operation or through the establishment of a state microwave network. Involved in the establish-

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"Saludos Amigos," Spanish instructional television series for the seventh and eighth grades in Missoula, originates in the TV studio of Montana State University. Missoula Public School District Number One is responsible for the content and teaching of the series which is viewed in fifteen Missoula grade schools, three parochial schools and two schools outside the city. Montana State University provides production crews and facilities. The Missoula TV Cable Company transmits the programs to the participating classrooms.

ment of such a network are finding suitable sites for location of microwave relay transmission stations, serving these sites with power and access roads, and maintaining them. Since it is advantageous to place microwave relay stations on mountain peaks and other high prominences, the problem of securing physical access is frequently an expensive one. Cable linkage is impractical except over very short distances. The expense of cable, amplification systems, right-of-way and pole access would be prohibitive over the distances involved in a state the size of Montana.

There remains the tape and film type of networking. While not technically a network, the purpose of networking is accomplished by distributing tapes or films among stations. Such a "network" involves the cost of kinescope recording facilities or video tape recording and play-back facilities. Since these pieces of equipment can be used for basic production purposes and, most importantly, for storage of TV program materials, the establishment of a network by these means as an initial step may prove to be of special interest in Montana's case. Subsequently, a microwave network could be built without destroying the value of existing kinescope or tape facilities.

The cost of each microwave station capable of receiving and retransmitting ranges from $10,000 to $15,000 for capital equipment plus costs of site and power. The cost of video tape recorders of a professional broadcast variety ranges at present from $40,000 to $60,000 per machine. More moderately priced TV tape recorders have recently been introduced. These range in price from $15,000 to $27,500. The tape which they produce is not compatible with professional-type machines and while these tapes are of passable quality, they do not equal the quality of the professional recorders. To the cost of $7,000 to $20,000 initial cost of a kinescope film recorder must be added the cost of processing and printing of the finished films. These costs approximate $40 to $50 per half-hour program while the cost of video tape per half-hour program is approximately $120, but it should be remembered that tape can be erased and re-used up to one hundred times.

Federal Matching Grants for ETV

Public Law 87-447, recently enacted by the U. S. Congress, authorizes $32 million in federal matching grants for the construction of educational television broadcasting facilities. The law allows any one state to receive up to one million dollars in matching grants and is intended as a stimulus to the construction of ETV stations in areas where none now operate.

Regulations for the administration of the law are expected to be ready in mid-August, 1962. It is certain that the Department of Health, Education and Welfare, administrator of the law, will judge applications for matching grants in the light of state and regional ETV planning. The Secretary of Health, Education and Welfare must base his approval of grant applications on criteria "designed to achieve (1) prompt and effective use of all educational television channels remaining available, (2) equitable geographical distribution of educational television broadcasting facilities throughout the States, and (3) provision of educational television broadcasting facilities which will serve the greatest number of persons and serve them in as many areas as possible, and which are adaptable to the broadest educational uses."

Public Law 87-447 could cut Montana's costs of establishing ETV stations and a state ETV network significantly.

CHAPTER 7

A Plan for Development of Instructional TV in Montana

The use of instructional television has already begun in some communities in Montana. Interest is being shown in development of this new educational tool in several other comunities.

A plan for Montana's school use of TV should begin from present circumstances and progress in orderly fashion to the possibility of TV reception by all classrooms in the state.

This chapter identifies existing ETV projects in Montana, indicates logical steps in the further development of ETV in our state through existing TV facilities, and proposes a plan for the development of a state ETV network.

Current First Steps in Montana

The College of Great Falls and Montana State College have successfully pioneered in college-level TV instruction. Miles City's public schools experimented for one year with filmed foreign language instruction by TV. The 1961-62 school year sees two public school systems engaged in the beginnings of instructional TV at the public school level.

Kalispell's junior high school has begun closed-circuit TV instruction in its eighth-grade science classes. Seventeen classrooms have been linked with the science demonstration room and supplied with TV receivers. An industrial vidicon camera and modulator have been donated by the Kalispell cable company, Northwest Video. Heretofore, the science instructor has made sixteen identical science demonstrations each week for the sixteen sections of eighth grade science. With closed-circuit TV, one such demonstration can be viewed simultaneously by all sixteen sections. The time saved by this means is being devoted to improving science instruction and the demonstrations.

Missoula School District No. 1 has embarked on a program of Spanish instruction in the seventh and eighth grades of all fifteen schools in the district. The schools have been linked with the TV studio of Montana State University by the Missoula TV Cable Company. Spanish lessons are transmitted to the schools three days each week by TV. The district furnishes receivers and the TV teacher. The University furnishes the TV studio and production. Lessons began in February, 1962. Interest in similar projects has been shown in other Montana cities—Great Falls, Billings, Helena, Butte, Bozeman and Dillon.

More ETV Starts: The Necessary Second Step

School systems located in communities where TV facilities exist would naturally be in a position to begin instruction by television.

Two routes are immediately available in Montana cities where commercial TV stations and cable systems are in operation. In Missoula, Helena and Great Falls such a choice is available; cable systems being planned in Butte and Anaconda will give schools in these cities a similar choice. In seventeen communities, in addi-

KUON-TV 12
BACKYARD FARMER

Educational television stations typically devote a large portion of their time to adult education and information programming. At KUON-TV, the University of Nebraska's ETV station, this program brings together experts on several facets of landscaping, gardening and allied subjects.

tion to the four cities listed, cable facilites present the opportunity to begin instructional television.

In Billings and Glendive, commercial TV stations offer immediate means for school coverage in addition to school-operated transmitters or closed-circuit systems. Stations and cable systems in Montana cities have been generous in offering use of their facilities; schools should not ignore such opportunities. Appendix B lists the commercial TV stations and community antenna systems in Montana.

Extended Coverage: The Third Step

As instructional TV develops in the various school systems throughout the state, developers of ETV should be alert for opportunities to develop expanded coverage through inter-city linkage and exchange programs. At the present time, three alternatives being discussed in various quarters may have implications for state-wide development. Commercial TV stations are considering linkage of various extents. Community antenna systems are planning linkages which may develop into a complete state system. A state system of microwave communications is being considered. Appendix C presents a map of existing microwave common carrier TV service in Montana.

Schools, university units and the Montana ETV Committee should be aware of these and continuing developments and explore fully, with those persons representing ownership and management of these systems, the possibilities of cooperative use of facilities. The value of kinescope recording facilities as a means of extending coverage should be realized. Future video tape facilities will present additional opportunities for extended coverage.

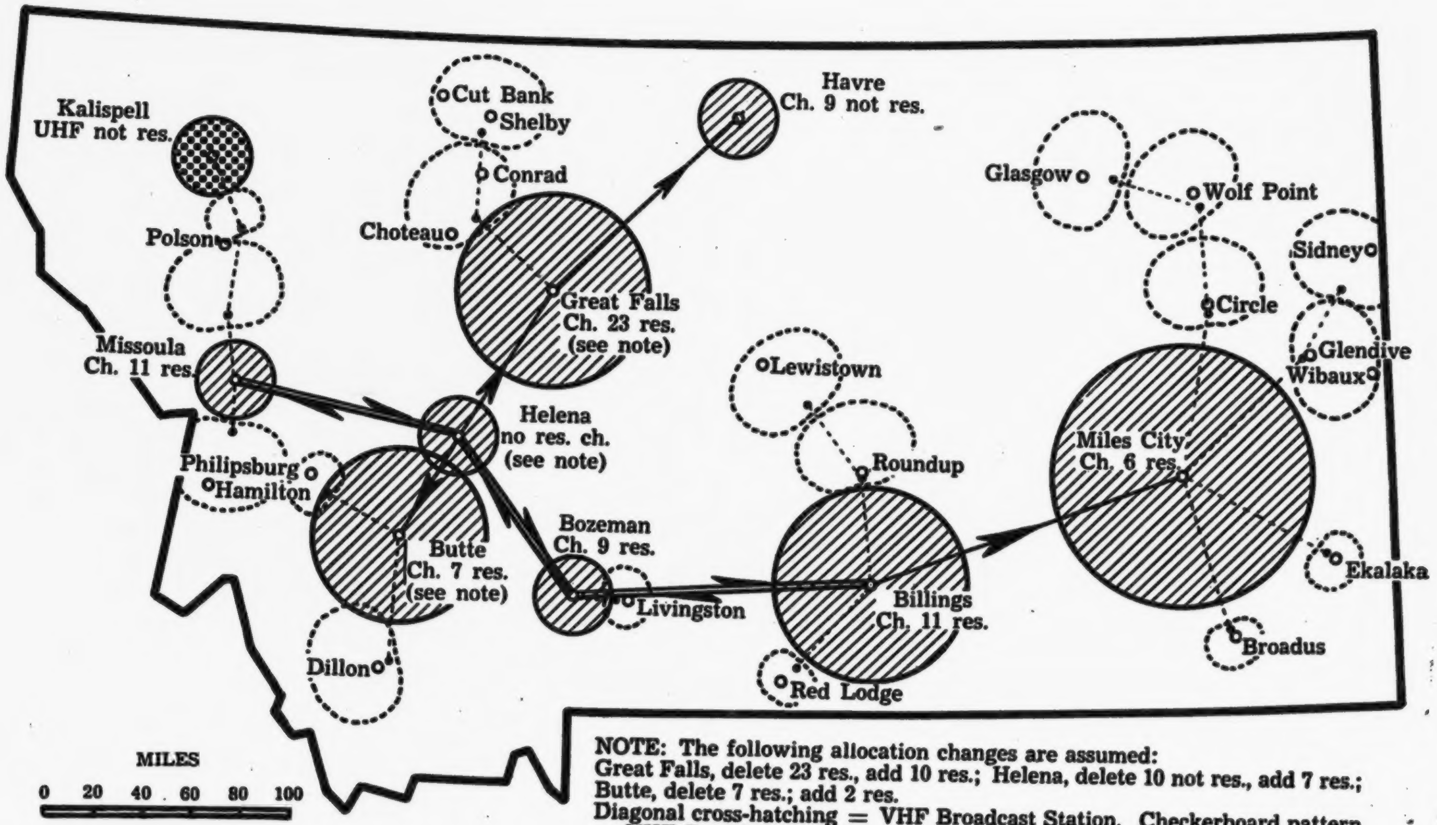
A State ETV Network: The Logical Extension

To cover schools in all parts of the state with instructional television will require a system capable of extensive programming for a number of hours daily. In some areas, demands will require a number of channels simultaneously. Such needs can best be met by a network of ETV transmitting stations in combination with translator stations and closed-circuit systems.

The proposed ETV network described in this report is a minimum one. It should not be regarded as complete in either coverage or the development of individual production centers. Although such a network may not prove itself economically and educationally sound until after other steps in ETV development described above have been taken, it is important to the development of educational television in Montana that a plan be set forth, and that agreement which will make for sound planning be reached in advance of developments.

Figure 7 and Appendix D present a map and supplementary data on the proposed Montana State ETV Network. A minimum number of originating studios could feed this network from Montana State University and Montana State College, where studios already exist, and from additional sites such as Helena and perhaps Billings and Great Falls. The transmitting stations would vary in power according to the area which can be economically served. Low-power transmitters would suffice for areas like Missoula, Bozeman, and Helena, where the population is concentrated in a relatively small area surrounded by difficult terrain and very sparse population. Medium-power transmitters seem logical for areas like Great Falls, Billings, and Miles City where the terrain is more level and the signal can reach many small communities and schools. Furthermore, higher power in these areas permits reception by more distant translator stations for rebroadcast to additional areas. High-power transmitters on mountain-top locations are very costly in terms of both capital expenditures and operating costs. The recommendation in this report is based on the assumption that service to additional schools is more economically achieved by translators. A comparative engineering study would be necessary to develop a precise determination on this point.

An important aspect of the proposed minimum network plan is its integration of exisiting TV facilities and the additional studio proposed for Helena into a tightly-knit cooperative production facility for elementary and secondary school programming. It appears prudent to recommend that the network of transmitters be fed programming from the three originating studios in a schedule which alternates origination points. The alternative is a loosely-knit federation of independent stations which might frequently duplicate each other's efforts. Montana can ill afford, particularly at the outset of ETV development, the luxury of duplication. The operation proposed here is tailored for Montana's needs and resources and designed to bring Montana's schools the greatest service for the investment. The proposed network of three production centers could be operated at roughly the cost of a single center since each would be responsible for only one-third of the live originations fed to the network. Such



Kalispell
UHF not res.
Polson
Missoula
Ch. 11 res.
Philipsburg
Hamilton
Dillon
Cut Bank
Shelby
Conrad
Choteau
Great Falls
Ch. 23 res.
(see note)
Helena
no res. ch.
(see note)
Butte
Ch. 7 res.
(see note)
Bozeman
Ch. 9 res.
Livingston
Havre
Ch. 9 not res.
Lewistown
Roundup
Billings
Ch. 11 res.
Red Lodge
Glasgow
Wolf Point
Circle
Sidney
Glendive
Wibaux
Miles City
Ch. 6 res.
Ekalaka
Broadus
MILES
0 20 40 60 80 100

NOTE: The following allocation changes are assumed:
Great Falls, delete 23 res., add 10 res.; Helena, delete 10 not res., add 7 res.; Butte, delete 7 res.; add 2 res.
Diagonal cross-hatching = VHF Broadcast Station. Checkerboard pattern = UHF Broadcast Station. Open patterns = 10 & 100 watt UHF Translators. Solid lines represent microwave relay circuits. Double lines signify reversible microwave circuit. Dashed lines signify off-the-air relay.

By ARCHER S. TAYLOR, Consulting Radio Engineer

FIGURE 7. Proposed Montana State ETV Network.

a plan, though not the usual one found in most states, is similar to the operation found in the Alabama ETV network. It presupposes a high degree of cooperation among the production centers to the benefit of the schools of the entire coverage area. It does not prevent the individual production centers from producing and broadcasting additional programming if such is the desire of the institutions or agencies at which these centers are located.

The proposed network would reach an estimated 75 per cent of the state's population and a slightly smaller percentage of the state's classrooms. Since no accurate map locating all Montana schools is available, the latter figure is only a rough estimate, but it is safe to say that between two-thirds and three-fourths of the state's classrooms would be found within the coverage area of the projected network. Furthermore, the network could be extended to reach additional schools. However, if the network were extended to more and more sparsely populated areas, it is obvious that the cost of adding schools would involve an increasing cost-per-school.

The cost of building the proposed network is estimated at $1,500,000. This figure includes transmission, studio, and microwave equipment but excludes cost of buildings to house the equipment. Studio equipment in addition to that existing, would be minimal at MSU and MSC since studios already operate there. Origination from Helena would require complete studio facilities. These costs are included in the estimate. The remaining broadcast transmitters would operate without origination equipment. The translators would operate unattended.

It is logical that such a proposed network be built in stages. In setting forth such stages, existing resources and needs should be considered in order to keep costs as low as possible and utility as great as possible. The two parts of the network, program origination and transmission, do not allow an easy division into stages; nor is it possible to predict with complete accuracy where instructional TV activity will develop or that it will necessarily be located in logical geographic or population centers.

However, beginning with the assumption that instructional television will grow most rapidly in those areas where activity has already begun and where interest is being expressed, a division of a full state network's development into stages has been projected. Figure 8 outlines these stages.

Stage	Development	Capital Cost	Annual Technical Personnel Cost	Annual Production and Management Personnel Cost	Annual Operations Cost (Excluding lesson costs)	Total Annual Operating Cost by Stages	Annual Capital Replacement Budget
1	Transmitters at Missoula, Bozeman; Microwave Missoula to Bozeman; Studio improvements Missoula, Bozeman; Maintenance capital items	$ 405,000	$ 33,000	$ 40,000	$ 69,000	$142,000	$ 54,000
2	Transmitters at Helena, Billings, Butte, Great Falls; Microwave to Helena, Billings, Butte, Great Falls; Network headquarters; additional maintenance capital items	$ 485,000	$ 45,000	$ 22,000	$ 38,000	$105,000	$ 64,500
3	Transmitters at Kalispell, Miles City, Havre; Microwave to Miles City, Havre	$ 335,000	$ 13,000		$ 25,000	$ 38,000	$ 44,500
4	Studio Helena	$ 100,000	$ 9,000	$ 20,000	$ 20,000	$ 49,000	$ 13,500
X	Translators at locations where interest develops as transmitters are built which can serve them	$ 175,000			$27,000	$ 27,000	$ 23,500
	Total	$1,500,000	$100,000	$ 82,000	$179,000	$361,000	$200,000

FIGURE 8. Cost of Building Montana ETV Network by Stages.

Staffing the Network: Technical

To staff such a network with full-time transmitter engineers would be expensive. Because of this high cost, serious efforts should be made to arrange operation of transmitters in combination with existing commercial broadcast transmitters. This is technically possible at all of the proposed locations of ETV transmitters.

It is estimated that contracts for the operation of the nine transmitters in the proposed network could be negotiated at a cost of approximately $22,500 annually.

Maintenance of the microwave relay system and the unattended translators would require a minimum of three men at an estimated cost of $16,200 annually.

One and one-half full-time studio technicians at each of the three origination points would cost $27,000 annually.

As the network develops, and with the full network in operation, a network engineering supervisor at $8,000 and a network technical director at $10,000 would be required.

The total annual technical staff cost is estimated at $100,000 for the full network. Operation for eight hours daily for the nine-month school year is assumed. This staff cost can be divided according to the stages outlined in Figure 8.

Staffing the Network: Production

Operation of the three production centers would require a minimum of three persons at a supervisory level at each center. The TV studios at Montana State University and Montana State College already serve campus and other production functions; it is not the purpose here to circumscribe these operations. Rather it is recommended that three additional persons would be required to serve the functions of the state instructional TV network of stations. The three persons per center recommended here, a station manager, a program director, and a production supervisor, would of course not work alone. In addition to the studio technicians listed above under technical personnel, these persons would be assisted by TV teachers and curriculum advisors from the schools served. In most stations in the nation, student assistance has proven adequate for work in crew positions such as cameramen, lighting and staging workers, announcers, projection operators, assistant directors, audio men, etc. Furthermore, at the minimum level planned for the early operation of the Montana production centers, each of the three supervisory personnel listed would perform a broad range of functions in actual production, direction, script writing, planning, and administration.

The production personnel described here would require a total budget of $60,000 annually for the network's three production centers.

At the network level, two persons would be required for management, production, and developmental functions. In the beginning stage one person could handle the responsibility of coordinating programming and development. As the offerings and the size of the network increased, an additional person would be required. The network manager, responsible to the State Superintendent of Public Instruction and the State Board of Education, ex-officio Regents of the University of Montana, would supervise the operation of the network and work in development of coverage for additional schools. The network program director should coordinate the programming of the network and work in the development of new program materials. The budget for these two positions should be adequate to attract high-calibre persons with supervisor qualifications and experience, and is here estimated at $22,000 annually.

Production and management personnel costs are divided into stages in Figure 8.

Operating the Network

The cost of operating the proposed ETV network is based on an eight-hour day, five-day week, and nine-month school year. The budget figures listed are based on an operation in which each of the three origination studios produces one hour of live instruction per day for distribution to the network, one hour of live instruction and one hour of filmed or taped instruction per day for local or regional viewing. In addition, one studio serving as network headquarters would originate three hours of filmed or taped instruction for all transmitters. The schedule broadcast by each originating studio would thus total two hours of live instruction locally, two hours of live instruction received from the other two studios, one hour of film or tape originated locally, and three hours of filmed or taped materials received from one studio serving as network headquarters. This schedule would equal eight half-hour lessons or twelve twenty-minute lessons daily live and eight half-hour lessons or twelve twenty-minute lessons daily by film or tape recording.

If the costs of producing individual lessons are to be borne by the cooperating school districts, the network operating costs for the schedule would be reduced to the cost of filmed and taped materials, hourly wages for secretarial and student help, electricity, and supplies and repairs. These are estimated at $179,000 annually. If TV teachers' salaries, lesson production costs, and costs of film and tape rentals are to be assumed by the network, the operating cost would be an estimated $325,000 annually.

Cost Per Pupil

Total personnel and operating costs for the entire network as estimated and detailed in Figure 8 is $361,000 annually not including instructional costs. Including instructional costs, operating costs total $506,000. Total capital costs for the network are estimated at $1,500,000.

A rough estimate of the number of public and private elementary and secondary pupils to be covered by the network is 130,000. Cost per pupil for non-recurring capital expenditure to build the network is therefore estimated at $11.54. Operating cost per pupil per year, not including instructional costs, is projected at $2.77. Cost per pupil per year, including instructional costs, is projected at $3.89. These costs are far below the per-pupil cost of other methods of instruction. In 1959-60 Montana spent an average of approxiately $424 from tax-supported funds per pupil in grades one to twelve. Two miles of super-highway frequently cost more to build than the total educational television network and annual operating costs as proposed here. If Montana chooses to equalize the educational opportunities of its school children and to improve their education, educational television offers an economical means for reaching these goals.

CHAPTER 8

Recommendations for the Development of TV in Montana's Schools

Based upon the study of the Montana ETV Committee, the following recommendations are made:

1. That a network of educational television stations be established in Montana to serve elementary, secondary, higher, and adult education.

2. That Montana's educational television network be organized under the existing state authorities in education, the State Superintendent of Public Instruction and the State Board of Education, ex-officio Regents of the University.

3. That funds be made available to the State Superintendent of Public Instruction and the State Board of Education, ex-officio Regents of the University, for contracting with an independent consulting engineer for an engineering survey to establish precise technical details and costs of the state ETV network as proposed in this report.

4. That the State Superintendent of Public Instruction and the State Board of Education, ex-officio Regents of the University, through appropriate channels, apprise officials of the state government and legislators of the need for appropriation of the funds necessary for the

establishment of such an ETV network and that due consideration be given this need.

5. That the Montana ETV Committee seek to obtain the active cooperation of all agencies, organizations, groups, and individuals necessary to expedite the establishment of an educational television network. Cooperation and assistance should be sought from the Governor, the Legislature, the State Board of Education, ex-officio Regents of the University, as well as local school boards, administrators, and the professional educational associations. Furthermore, that the Committee seek the active cooperation of Montana commercial television stations, community antenna companies, common carrier companies, and such utilities as can assist in this development.

6. That the Montana ETV Committee continue to work to develop a public awareness of the advantages and requirements of educational television as a teaching medium and seek to stimulate planning by local and state agencies to incorporate educational television into the future education program; that consideration be given to:

   a. Provision at the units of the University of Montana for instruction in the classroom use of television for all teacher trainees, professional training in the production of television instruction, and training in the administration and coordination of television instruction.

   b. The design and construction of future school buildings, elementary, secondary and college, to make possible the best use of instructional television.

   c. The scheduling of workshops and conferences at all levels of education to develop understanding on the part of teachers, administrators, and lay citizens of the role of instructional TV in education.

7. That the Montana ETV Committee be continued as an advisory board to the State Superintendent of Public Instruction and the State Board of Education, ex-officio

Regents of the University, and that the committee, as required to carry out its functions, designate individuals or groups to serve as task forces in specific areas.

8. That the Montana ETV Committee continue to keep abreast of developments in educational television and to inform Montanans of these developments in order to bring the benefits of such development to the state.

Appendix A

ETV INSTALLATIONS INSPECTED DURING COURSE OF 1960-61 MONTANA ETV PROJECT STUDY

Los Angeles City Schools
Los Angeles County Schools
Pasadena Public Schools (studio only)
Los Angeles State College
University of California at Los Angeles
University of Southern California, Los Angeles
Anaheim (California) City Schools
Compton College (Los Angeles)
San Diego State College
State of California, Department of Education, Sacramento
KVIE-TV, Sacramento
Sacramento Public Schools
San Jose State College
San Jose Public Schools
KQED-TV, San Francisco
University of California, Berkeley
San Francisco State College
Humboldt State College, Arcata, California
University of Oregon, Eugene
Oregon State College, Corvallis
KOAC-TV, Corvallis
Extension Division Oregon State System of Higher Education, Portland
KOAP-TV, Portland (in construction)
KCTS-TV, Seattle
University of Washington
Pacific Lutheran College, Tacoma
KPEC-TV, Clover Park, Washington
WTTW-TV, Chicago
WOSU-TV, Columbus, Ohio
Ohio State University, Columbus
KUON-TV, Lincoln, Nebraska
Lincoln Public Schools
University of Nebraska, Lincoln
Wilber (Nebraska) Public Schools
KTCA-TV, Minneapolis-St. Paul
St. Paul Public Schools
St. Paul Parochial (Catholic) Schools
Minneapolis Public Schools
Midwest Program on Airborne Television Instruction, Lafayette, Indiana
WTVS-TV, Detroit
Detroit Public Schools
WQED-TV and WQEX-TV, Pittsburgh
Pennsylvania State University, University Park
Philadelphia Public Schools
WHYY-TV, Philadelphia
National Association of Educational Broadcasters, Headquarters, Washington, D. C.

National Educational TV and Radio Center, New York City
Joint Council on Educational Broadcasting, Washington
Department of Audio-Visual Instruction, National Education Association, Washington
Washington County Public Schools, Hagerstown, Maryland
Dade County Public Schools, Miami, Florida
WTHS-TV, Miami
WEDU-TV, Tampa
Florida West Coast ETV Project
Tampa Public Schools
Alabama ETV Commission, Birmingham, Alabama
University of Utah, Salt Lake City
KUED-TV, Salt Lake City

Appendix B

COMMERCIAL TV STATIONS IN MONTANA

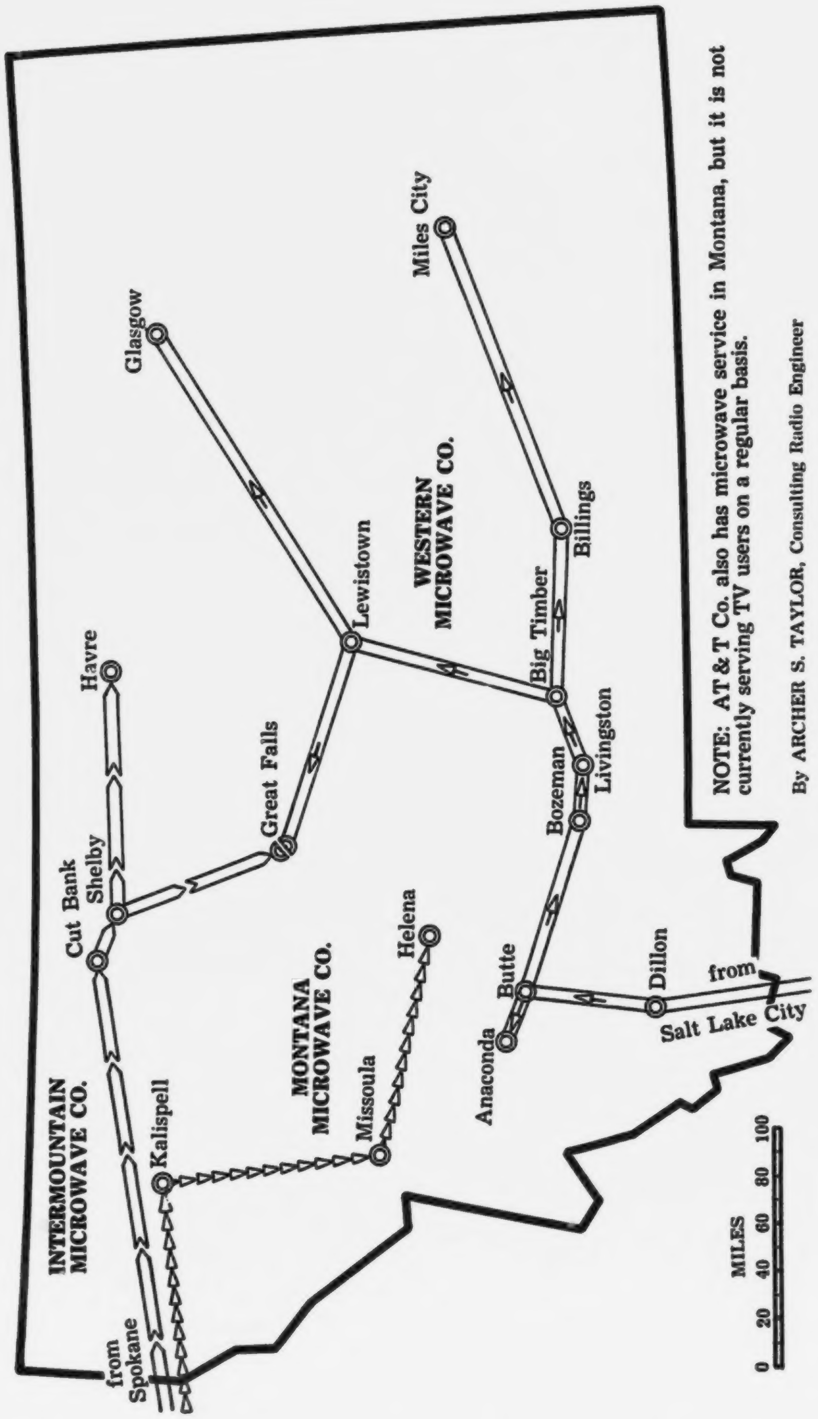
Billings	KGHL-TV KOOK-TV	Channel 8 Channel 2
Butte	KXLF-TV	Channel 4
Glendive	KXGN-TV	Channel 5
Great Falls	KFBB-TV KRTV	Channel 5 Channel 3
Helena	KBBL-TV	Channel 12
Missoula	KMSO-TV	Channel 13

COMMUNITY ANTENNA SYSTEMS IN MONTANA

Alberton
Anaconda (planned)
Big Timber
Bozeman
Butte (planned)
Cut Bank
Dillon
Eureka
Glasgow
Great Falls
Havre
Helena
Kalispell
Lewistown
Livingston
Miles City (reactivation planned)
Missoula
Shelby
Troy - Libby
Whitefish
Winifred

Appendix C

EXISTING MICROWAVE COMMON CARRIER TV SERVICE


Havre
Cut Bank
Shelby
Great Falls
Glasgow
Lewistown
Miles City
Billings
Big Timber
Livingston
Bozeman
Butte
Anaconda
Dillon
from Salt Lake City
Helena
Missoula
Kalispell
from Spokane
INTERMOUNTAIN MICROWAVE CO.
MONTANA MICROWAVE CO.
WESTERN MICROWAVE CO.
MILES
0
20
40
60
80
100

NOTE: AT & T Co. also has microwave service in Montana, but it is not currently serving TV users on a regular basis.

By ARCHER S. TAYLOR, Consulting Radio Engineer

Appendix D

EXPLANATORY DATA FOR PROPOSED MONTANA ETV NETWORK

Location of Transmitter	Population Covered	Percent of State Total	Cost	(E.R.P.)	Height
BROADCAST STATIONS:					
Billings	87,090	12.9%	$120,000	18kw	500 ft.
Bozeman	19,274	2.8	70,000	3kw	300
Butte	74,607	11.0	70,000	3kw	800
Great Falls	79,976	11.9	120,000	18kw	500
Havre	12,578	1.9	70,000	3kw	300
Helena	24,255	3.6	70,000	3kw	300
Kalispell	20,568	3.0	65,000	5kw (UHF)	350
Miles City	19,480	2.9	120,000	18kw	800
Missoula	42,946	6.4	70,000	3kw	300
TRANSLATORS:					
Broadus	1,284	—	5,000	10w	—
Circle	2,219	—	13,000	100w	—
Conrad-Choteau	8,902	—	13,000	100w	—
Dillon	5,163	—	13,000	100w	—
Ekalaka	1,348	—	5,000	10w	—
Glasgow	14,003	—	13,000	100w	—
Glendive	9,508	—	13,000	100w	—
Hamilton	11,039	—	13,000	100w	—
Lake County (2)	12,429	—	18,000	100w & 10w	—
Lewistown	10,986	—	13,000	100w	—
Livingston	8,605	—	5,000	10w	—
Philipsburg	1,673	—	5,000	10w	—
Red Lodge	3,306	—	5,000	10w	—
Roundup	4,175	—	13,000	100w	—
Shelby-Cut Bank	11,299	—	13,000	100w	—
Sidney	9,952	—	13,000	100w	—
Wolf Point	4,836	—	13,000	100w	—
TOTALS:					
Broadcast Stations	380,774	56.4	775,000	—	
Translators	130,722	19.3	175,000	—	
Microwave Relay	—	—	250,000	—	
Studios	—	—	250,000	—	
Production and Maintenance Capital Equip.	—	—	50,000	—	
	511,496	75.7	$1,500,000		
Total State Population	674,767				

Population figures from 1960 Final Report of the Census Bureau.

Appendix E

The titles listed below are intended as a source of general information on instructional and educational television. A great deal of technical and research data is also available in the literature of ETV though not listed here.

"Teaching by Television"—a report from the Ford Foundation and the Fund for the Advancement of Education on experiments with TV instruction in schools and colleges. Available free from The Ford Foundation, Office of Reports, 477 Madison Avenue, New York 22, New York.

"ETV: A Pictorial Report"—The Ford Foundation report in pictures and brief narrative of the history, principles, problems, potential and results of ETV programming and TV teaching. Available free from The Ford Foundation, Office of Reports, 477 Madison Avenue, New York 22, New York.

"And TV Too"—a report of a 1961 conference held by the Department of Audio-Visual Instruction of the National Education Association. Its eight chapters cover the eight areas of concern in instruction by TV. Valuable as a how-to-plan and do-it aid. $1.25. D.A.V.I., N.E.A., 1201 Sixteenth Street, N.W., Washington 6, D.C.

"The Uses of Television in Education"—a summary of findings by the North Central Association of Colleges and Secondary Schools' Subcommittee on TV. Includes sources of further information and bibliography. Available free from: Secretary, N.C.A., University of Chicago, 5835 Kimbark Avenue, Chicago 37, Illinois.

"Teach With Television"—by Lawrence Costello and George Gordon, Communications Arts Books, Hastings House, 1961, New York, $5.50. Two N. Y. Univ. ETV teachers present a great amount of valuable information on how, when and where to use instructional television.

"Educational Television Guidebook"—Phillip Lewis, McGraw-Hill, 1961, New York. $4.95. The Director of the Bureau of Instructional Materials for the Chicago Board of Education has prepared this book for the Electronic Industries Association to furnish educators and administrators with background information on ETV, to furnish guidance on operations procedures, to indicate applications of ETV, and to provide information for planning and installation of ETV systems.

"Using TV in the Classroom"—edited by Mary Howard Smith, McGraw-Hill, 1961, New York. $2.50. A handbook which treats instructional TV from the viewpoint of the classroom teacher. Prepared for the Midwest Airborne TV Project, it is an aid to utilization of TV instruction.

"Television Teaching Today"—by Henry R. Cassirer, UNESCO Publications Center, 801 Third Avenue, New York 22, New York. $4.00. A report of the use of TV in education in five foreign countries and

the U.S.A. 175 pages devoted to descriptions of how TV is used in various schools and colleges in the U.S.

"The Impact of Educational Television"—edited by Wilbur Schramm, University of Illinois Press, Urbana, 1960, $5.00. Fourteen reports on ETV in the community, in the classroom, TV and children, by authorities who speak from a background of research.

"New Teaching Aids for the American Classroom"—Institute for Communications Research, Stanford University, 1960. A symposium on the state of research in instructional television and tutorial machines.

"Television in Teacher Education"—American Association of Colleges for Teacher Education, Washington, D.C., 1960, $1.50. A report on the possibilities of TV for the education of teachers, for college instruction in general, and for public schools.

"Television in Instruction: An Appraisal"—Department of Audio-Visual Instruction, National Education Association, 1201 Sixteenth Street, Washington, D.C., 1958, $1.00. A report of a seminar on the role of TV in instruction which looks at TV's various roles in education and teacher education.

"Interaction in Learning: Implications for Television"—Department of Audio-Visual Instruction, National Education Association, 1201 Sixteenth Street, Washington, D.C., 1959, $1.00. A report of a seminar on ETV which investigates the learning situation and the role of TV instruction in the light of learning theory.

"Opportunities for Learning: Guidelines for Television"—Department of Audio-Visual Instruction, National Education Association, Washington, D.C., 1960, $1.50. A report of a seminar which explored in depth the problems of planning and implementation of ETV in schools with emphasis on improving quality of instruction.

"Teaching Through Television"—by Henry Dieuzeide, Organization for European Economic Cooperation, Office for Scientific and Technical Personnel, 1346 Connecticut Avenue, N.W., Washington 6, D.C., 1960, $ .75. A report on the current use of TV in Western European schools and an examination of possibilities for using this medium to meet the critical need for increased teaching of science.

"Schools for Tomorrow: An Educator's Blueprint"—by Alexander J. Stoddard, Fund for the Advancement of Education, 655 Madison Avenue, New York 21, New York, 1957. A report on the teacher shortage, its causes and implications, and what is being done to meet it; raising the level of teacher effectiveness; adapting present and new school buildings and other facilities to meet changes in methods; and the use of TV as an integral part of the instructional program at all levels.

"ETV: The Next Ten Years"—edited by Wilbur Schramm, the Institute for Communication Research, Stanford University, Stanford, California, and the U. S. Office of Education, 1962. Available free, this collection of articles discusses all phases of ETV development, including financing, organization, TV's future in education and the recommendations of th TV Advisory Panel of the U. S. Office of Education.

Much valuable information can be obtained by writing to various school systems using TV (Anaheim, California; Hagerstown, Maryland; St. Paul, Minnesota; St. Louis, Missouri; Seattle, Washington; Ogden, Utah; Salt Lake City, Utah; etc.), by writing to any of the ETV stations in the nation (KUED-TV, Salt Lake; KCTS-TV, Seattle; KQED-TV, San Francisco; KUON-TV, Lincoln; KRMA-TV, Denver; KOAC-TV, Corvallis, Oregon; etc.), or by writing to the Joint Council on Educational Broadcasting, 1785 Massachusetts Avenue, N.W., Washington 6, D.C.; The National Association of Educational Broadcasters, 1346 Connecticut Avenue, N.W., Washington 6, D.C.; or the National Educational TV and Radio Center, 10 Columbus Circle, New York 19, New York.